The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXIX. October 28, 1933 No. 748

Notes and Comments

Home Produced Oils

THE question of the production of oil from coal, like the poor, seems to be ever with us. Particularly since Imperial Chemical Industries, Ltd., took a hand in the game, the interest of the chemical industry in the subject has been intensified. We have heard grandiose schemes propounded by some who, with what seems to us to be more enthusiasm than discernment, have suggested oil from coal schemes involving millions of tons of coal per annum. Sir John Cadman has told us that oil is not really the villain of the piece, and that from this standpoint the production of oil from coal is not likely to fulfil the extravagant hopes placed upon it in some colliery circles. Nevertheless Sir John apparently believes that there is some future in hydrogenation, for he congratulates the chemical industry on having developed and taken possession of this new manufacture. Now comes our old friend Dr. Ormandy with the thesis that since oil can be produced from natural sources at quite ridiculously low prices, it is in the last degree foolish to spend so much time and money producing it in this country. Moreover, the oil so produced is not necessarily synonymous with petroleum oil, and is not necessarily to be assigned the same value. Even chemists are apt to forget when speaking of "oil" in the fuel sense that the term covers a multitude of products. The "oil" obtained from high temperature carbonisation is quite different from that from low temperature carbonisation, and this, in turn, will vary according to the temperature and the conditions of distillation. Hydrogenation oil will be different again. All these products are different from petroleum oil or from shale oil.

A Comparison with Petroleum Oils

IF oil from coal is to compete with petroleum products it must either be capable of doing so upon the same specification basis, or those who have such oil to sell must undertake the long and difficult task of proving that those specifications, which have grown into their present form through long usage, are not so good as the new ones that would be put in their place and that must apply for many years to come only to a trifling proportion of the world's oil supply. The opinion seems to be that oil produced from coal is definitely inferior to petroleum products when judged by the same standards.

The financial situation seems to Dr. Ormandy and to his collaborator, Dr. Burns, to be a source of grave uncertainty, since it depends exclusively on the taxation of the foreign-produced product and this in turn depends on political action. The present price of petrol, for example, in tank steamer lots is of the order of 3d. per gallon available for storage alongside British ports, while fuel oil is being put into bunkers at about £2 a ton. If we take away the 8d. tax on petrol, or the £1 a ton on fuel oil, where then do the producers of oil from coal stand?

There is another side to the picture that should be an inspiration to chemists. Whilst the tax is in force, British chemists have a breathing space in which to cheapen their process for home oil production. Much has been done already and we do not think our chemists will fail us. National safety, moreover, demands a home source of oil; this demand will be the most powerful incentive to the chemical industry to put forward its best efforts for the solution of the problem.

The Chemist's Career

SIR JOHN REITH has been discussing how a career should be chosen. Consciously or unconsciously his remarks are obviously based on his experiences with his staff at the B.B.C. In his view the choice of a career should not be too long deferred, nor should it be left to the boy to decide. His parents should observe his likes and dislikes, and should by suggestion and training direct the boy's thoughts from the age of ten years upwards into the channel which seems best for him. Given really wise parents—but how many parents are really wise?—the system would be infinitely preferable to the round-pegs-in-square-holes business that is so often seen. Nevertheless there is danger in it, and particularly in this country. The British are above all things a nation of individualists, that is the only thing in which they are alike. Anything that takes away that individualism must be suspect and too much parental control, even too much parental guidance, will quite certainly tend to that end. We believe the best Britons are those who, after a good liberal education have left home early to fend for themselves.

Scientific workers can never be made to order unless the inborn spark of genius is there. The great majority of workers in the chemical industry are semi-trained or untrained, we doubt whether there are a hundred men in the chemical industry that are fully

trained to take advantage of all the chances that a lifetime in the chemical industry can bring them. Provided some measure of education has been impressed, however, the deficiency can be made up by the man himself. The chemist who has taken his B.Sc. in chemistry, perhaps even with first-class honours, is still only half-trained. Does he understand chemical engineering? Is he *au fait* with the mysteries of modern salesmanship? Has he a knowledge of costing and works accountancy? All these and more should be required of those who would aspire to the control of great businesses. The evening classes are starting for the winter session. It would be valuable if managements would everywhere impress upon the younger element in their works the need for further study and the advantages to be gained by increase of knowledge.

Attendance at evening classes is one of the ways in which the individualistic Briton can set about carving out his own career. We hope this aspect of attendance at evening classes will be stressed. Too often do we hear complaints from lecturers that evening classes are apathetic or possibly openly disorderly; this applies particularly to those students who are largely compelled to attend by reason of the rules or rewards given by the firms that employ them. It was an Oxford don who was wont to say that education was the process of casting false pearls before real swine. We hope that, even if the rebuke should be justified in Oxford, it will not be earned by those who, in their own time, by their own money and for their own good, attend evening classes in those branches of technology by which they hope to earn something more than a living.

The Imperial Institute

AT the first meeting of the London section of the Society of Chemical Industry, protests were voiced against the possible and projected disappearance of the Imperial Institute. The occasion was the delivery of a paper by Dr. L. A. Jordan dealing with tung oil. Originally, some forty years ago, tung oil used in the preparation of varnishes was obtained only from China. There was constant trouble because the Chinese had no standard or scientific methods of manufacture; the purchaser never knew what the quality of the material shipped would be. Later the tung tree, *Aleurites Cordata*, was cultivated in America and a determined effort was made to capture the market for that country. The Americans and the Chinese are still virtually in possession of this market, but an attempt is being made to develop the cultivation in the Empire, many parts of which are eminently suitable.

The value of this work when it finally is brought to success will be considerable, and it is to such Empire developments that we must look for much of our prosperity in the future. The development of the tree in the Empire has been the joint work of the Imperial Institute, the Paint and Varnish Manufacturers' Association, and the authorities at Kew Gardens. The work of the Imperial Institute in such matters as this cannot well be over-estimated, for the Institute is in fact the only scientific link between the Government and the Colonies. Its loss would be irreparable—even more so than that of the Empire Marketing Board. The Imperial Institute is a valuable pioneer in testing every sort of raw material, in finding new uses for known materials and new industries for the Colonies. It also makes preliminary tests to see if commercial tests would be worth while and thus fulfils a unique service in the development of Empire trade. Among its activities the provision of Empire sources of raw materials for the chemical industry ranks high.

An Asset to Industry

REFERENCES made by speaker after speaker at the meeting to which we have referred, showed how deeply the work of the Institute is appreciated by chemists. We cannot afford at such a time as this to relinquish anything that is found to be of real assistance to any branch of trade and we trust that the authorities will take heed of the very definite desire expressed for the continuance of the Institute.

The present threat to the existence of the Imperial Institute arises from the disappearance of Dominion contributions, which have not collectively touched £10,000 for several years, although the income of the Institute is actually around £40,000. It has been suggested that the time may well be propitious for removing the Institute from the control of the Department of Overseas Trade; the Colonial Office and the Board of Education are more directly concerned in its work and it is suggested that financial support from private bodies may most reasonably be looked for from the scientific side of its work. No doubt the chemical industry will see the advisability of doing what may be necessary in that direction, having regard to the views expressed concerning the value of the Institute. If all those concerned do their part, the £10,000 which is needed should not be in danger.

The Science of Brickmaking

THE constitution of clay is still unknown. This is one of the many interesting facts given in a report on the economic and manufacturing aspects of the building brick industry, published by the Department of Scientific and Industrial Research. A theoretical substance "clayite," which has sometimes been identified with the mineral, kaolinite, has been postulated as an essential constituent of all clays. Kaolin, however, is very different from ordinary clays in many respects, particularly in its low plasticity. The characteristic properties of common clays, on which their commercial development depends, must be derived in great measure from the minor constituents or essential impurities which they contain. These constituents are, for the most part, lime, magnesia, alkalies, iron and silica, but very little is known of the form in which they exist in the clay. They act as fluxes and lower the fusion point of the "clayite," and so enable the material to be burned at a lower temperature; they also impart characteristic colours to the finished ware. The report in question deals with only part of a complete survey of the brickmaking industries which is being carried out by the Building Research Station. A small committee, consisting of Sir William Cecil Dampier, Mr. G. Mowlem Burt, Professor P. S. Florence and Mr. A. W. Flux, was set up to advise on the conduct of this survey. In addition to the sections now issued it is planned to publish four other sections of the survey dealing with outstanding technical problems, research and technical education, the properties of bricks, and a programme of research.

The Fuel that Failed

By PROFESSOR H. E. ARMSTRONG

THE address delivered by the incoming president of the Institute of Fuel, Sir William J. Larke, at the meeting held in London on October 18, is as delightful a smoke screen as presidential funnel has ever rolled out—an interesting, clearly and elegantly phrased, readable story of coal, from the remote past until to-day, from which we even learn that Lime is burnt by a "phenomenon" in Baku. It should be in the hands of every high school teacher of geography and history in the country. Works so classical as the 1878 volume on "Coal" by the Leeds professorial quintette and the still earlier and greater "Playbook of Metals," by Pepper, of Polytechnic ghostly fame, have been consulted in its preparation; the Director of Fuel Research has provided the commas; the t's have been crossed by a Mr. Evans. Still, it is scarcely the office of anyone, even with the aid of such a galaxy of talent, presiding over so burning a subject, merely to engage in the writing of school primers. Of course, it is a way of skating over thin ice.

The public has heard much discordant outcry about coal that is obviously all political and commercial propagandism. It now asks for a little truth: to be told where coal is to-day and might be tomorrow, if a little disciplined intelligence were at its service—no mere riverside research, without policy, though chaired by a railway magnate of ubiquitous activity. The public would like to learn whether anybody in the industry the least considers public interests; how many, if any, engineers have learnt to burn coal properly—if they have, why so many burn it improperly—the new power station, below Bridge, on the Thames, for example? While claiming that electricity is light, the electricians cause darkness and dirt in grinding it out.

Sir William tells us that the average man eats about 25 therms of energy per annum—if fed on coal, he would burn up about three tons during an average lifetime. The likely remark, of the man in the street, on this will be—"Say, stranger, what do you mean by coal, the stuff that will burn and warm us or that we buys and mostly puts in the dust-bin, if we don't make a rock garden of it." Sir William tells us not when the long suffering householder will be able to buy a standard something that is worthy to be called by a name of meaning—whether colliery rubbish is for ever to be railed and carted about the country—whether the sulphur is ever to be washed out to the lowest possible limit. The colossal power station at Battersea is being forced to wash its own sulphur dioxide. It is said, the equivalent of 30 tons of sulphur a day is being kept back and sent to poison the fishes. Smoke abatement is of small account, so long as we neither practice nor preach sulphur abatement everywhere. Use of coke, whether low or high temperature, won't help us, so long as we make it from sulphur coal—so long as the gas companies steadily support us as home vitriol makers. Research at Teddington has shown that the beautiful blue coating on copper domes all over the country, even in Ramsgate harbour by the sea, is mainly basic copper sulphate, not carbonate, showing how wide spread is the sulphur disease. The trees have long been silent witnesses of its ravages. Let anyone look into gardens opposite St. John's Wood station, if he seek examples.

We buy coal by weight but with how much water? There is no guarantee even for the steadiness of this component. The gas companies *are* beginning to sell coke dry. Speaking of coke, we are led to ask why, when this subject was brought forward at the Fuel Institute in the afternoon, the story was one "made in Germany." Why not coke British? Surely, to have had our own coke story told faithfully would have been highly instructive. Suppose we cease from worshipping everything German and leave Germany, for a time, to her own development. Hitler would set us a lesson in self-helpfulness. His meassage to the world would seem to be—"Endless talk by old women is futile: let's each do something for ourselves."

The president, at the end, drew attention to the object of the Institute of Fuel—"to make available to each the experience of all." Our present method is to exclude experience Something more than ancient history is needed to comply with this definition. We learn from the address that, in B.C. 330, a demonstration was given, to Alexander the Great, when he entered a certain city in Persia, by sprinkling a street with bitumen oil and setting fire to it. We do the sprinkling to-day but have yet to set fire to it: instead we slip on it and also wash it into the rivers and kill the fish. My Lords of Fuel! Can't we do something less imperial with Castrol and its fellow delinquents. Killing as we do three people a day, in London, with oil, we make sufficient sacrifice and might, at least, stop fuel from defiling the execution grounds.

Sir John Cadman had previously stated the case, Coal versus Oil, before the Institute, with more acumen and sense of proportion, showing how through neglect the cause of coal has fallen into decay. Yet coal is all but the sole prop of our industry. Contrast the oil industry to-day, its marvellous scientific equipment and clear cut policy, with the crass ignorance and primitive state of the coal industry—pace the Fuel Research Board and its hopelessly superior academic outlook; a lame dog limping along between other people's legs but to the tune of nearly £100,000 annually of public money! Established to undertake work beyond academic compass, it is mostly engaged on trivial tasks of no public consequence. Coal is being studied chemically in various laboratories—why should the board "cut in" to control results? It is prying about, everywhere, picking up other people's ideas, elaborating a little and then reporting the work as if it were its own, if not patenting. It made a Low temperature carbonisation plant in this way, which never worked but cost the country +£100,000, if I mistake not. The cause of iron is inseparable from that of coal. Both industries have been carried on with complete industrial incompetency. Investors in iron have fatally sacrificed their money upon an altar of limited liability tended by an ignorant priesthood with only blind commercial outlook, no science. The Rt. Hon. Lord Rutherford might well apply some of his transmitting energy to the introduction of reasoned intelligence into fuel research. If we are ever to play science in industry, let it not be a farce—the D.S.I.R. a reproach.

The Institute of Chemistry

September Examination Results

THE past list for the September examination of the Institute of Chemistry has been issued as follows:—

Examination in general chemistry for the associateship:—N. E. Cooper, Central Technical College, Birmingham; Miss J. M. Currington, University College, Nottingham; E. Finklestone, Central Technical School, Liverpool; H. E. Garrett, Polytechnic, Regent Street, London; W. R. Heading, B.Sc. Pharm. (Glas.), Royal Technical College, Glasgow; N. Heron, Central Technical School, Liverpool; P. F. Holt, B.Sc. (Lond.), University College, Leicester; J. A. Macnair, Royal Technical College, Glasgow; J. A. Marriott, B.Sc. (Lond.), University College, Leicester; R. H. McKinlay, Royal Technical College, Glasgow; J. S. Merry, Central Technical School, Liverpool; J. T. Peacop, A.M.C.T., College of Technology, Manchester; S. Shanks, A.M.C.T., College of Technology, Manchester; S. G. E. Stevens, B.Sc. (Lond.), Chelsea Polytechnic, London; J. Tattersall, Blackburn Technical College; B. E. Waye, B.Sc. (Lond.), A.R.C.S., Royal College of Science, London; J. H. Young, B.Sc. (Lond.), Northern Polytechnic, London.

Examinations for Fellowship:—Inorganic chemistry, with special reference to metallurgy: W. F. Harrison, M.Sc. (Birm.). Organic chemistry: A. Cooksey, B.Sc. (Lond.). Biochemistry: J. V. Loach, Ph.D. (Birm.). With special reference to the chemistry of proteins: H. A. A. Aiken, M.Sc. (N.Z.). The chemistry, including microscopy, of food and drugs, and of water: F. R. Johnson, M.Sc. (Lond.); M. M. Parekh, M.Sc. (Bombay), Ph.D. (Lond.).

Coke Oven Managers' Association

Prospects of Hydrogenation at the Pit-Head

THERE was a large and representative attendance, including members of kindred societies, prominent industrialists and representatives of constructional companies, at the annual dinner of the Coke Oven Managers' Association, held at the Royal Station Hotel, Newcastle-upon-Tyne, on October 19. Mr. W. E. Mordecai, the new president, was in the chair.

Sir JOHN FRY, chairman of the Bear Park Coal and Coke Co., proposing the toast of the Coke Oven Managers' Association, said the Association was not only one of great scientific attainments but at the same time its members were men of tremendously practical knowledge. It gave him pleasure to say on behalf of a very wide public how they appreciated the work of the Association in co-operation with such bodies as the Northern Coke Research Committee. They had been struggling for a long while under great difficulties and had seen times the like of which he hoped they would not see again. The greatest desideratum at the moment was a constructive peace in order to recover from the extraordinary commercial and industrial conditions which were the aftermath of the war. He thought they could look forward to such a constructive peace. They had come to the turning of the lane but could not see how long was the road ahead. In their own industry stocks of coke were being reduced and by next year they could hope for a much better position.

The President Looks Ahead

Mr. W. E. MORDECAI, president, responding, referred to the development of the Association and said that its ramifications had extended into all cognate industries and its members had been on many representative committees, local government bodies and some were even members of the magisterial bench. To the technical efforts of the Association was due to-day the fact that British metallurgical coke was the finest in the world, that British coke oven tar had no equal, that the demand for British coke oven motor spirit was insatiable and that coke oven gas was better than most kinds of gas and equal to any. When the Association met in Newcastle ten years ago the president said the sale of coke oven gas to outside undertakings was of the order of 4,000 million cu. ft.; in 1932 this figure had increased to over 30,000 million cu. ft. The greater development of the use of gas in industry, for traction purposes and for the manufacture of organic chemicals would determine much of the future success of the industry.

He believed that ultimately hydrogenation must come home to those whose ovens were situated at the collieries. Unfortunately hydrogenation had been masked by ideas of immensity, by conceptions of millions of pounds sterling, by the huge central undertaking and by the attenuated though virtuous vapourings of those who would gain the confidence of others with the soporific of employment for a few thousand miners. He visualised the possibility of the small hydrogenation unit at all collieries where the coal was amenable to that treatment. It was a question intimately bound up with the properties of gas, and gas might even prove to be a big rival of hydrogenated oils and spirits.

Great Days to Come

Mr. F. T. HATSWELL, general secretary, briefly proposed "The Guests," coupling with it the name of Councillor Angus Watson, deputy Lord Mayor of Newcastle.

Councillor ANGUS WATSON, responding, said their branch of industry was doing work which would bring a new era of prosperity. He urged them to remember, however, that industry was made for man and not man for industry. The largest contribution they could make was not to provide more work as such but more happiness and he was convinced that the greatest days were yet to come.

Mr. W. MCKEAG, M.P. for Durham City, also responded. Referring to the Coal Mines Act, Part I, he said that if it were possible for the coalowners to come forward with some guarantee that there would be no attack on wages or reduction of wages it would be a comparatively simple matter to secure the repeal of that much criticised Act. He believed they were on the eve of a substantial revival of the coal mining industry particularly through hydrogenation. The salvation of the coal trade lay in the realm of scientific research and it was to such men as the members of that Association they looked for it.

Mr. D. V. HOLLINGWORTH proposed the toast of the Universities, and coupled with it the name of Sir William Marris, vice-chancellor of Durham University and principal of Armstrong College.

Sir WILLIAM MARRIS said it was not the function of universities to solve problems but to provide the men who could tackle and solve them and the diversity of advice offered was no reason at all for mistrusting or losing confidence in the universities. The universities of the United Kingdom were doing yeoman service in extending the bounds of knowledge and inculcating sound thinking which would eventually make life happier.

More Chemical Research

Dr. W. SANDERS, of the coke oven department of Imperial Chemical Industries, proposed the toast of "Kindred Societies and Allied Industries" and coupled with it the name of Dr. R. E. Slade, managing director of I.C.I. (Fertiliser and Synthetic Products), Ltd. He said the closest possible association was necessary in the iron and steel, coal and coking industries. The coke oven industry owed a great debt of gratitude to the people who constructed their plants and they, in turn, owed a debt to the coke operators for their great attention to the carbonisation problems which came under their experience. He suggested that there should be a more intensive research into the chemical aspects of industry. Nor was there any need to regard the gas industry as a competitor of the coke industry. An increase in the use of gas must be gained by a closer collaboration between the two industries in matters of research.

Dr. R. E. SLADE, responding, said it was pleasing to see the mining industry in a more prosperous condition than usual but he suggested that it was rather regrettable that whenever a Government made agreements with foreign countries it was on the lines that if they took more coal we would take more of their chemicals. Great changes were iminent, not only via hydrogenation but in other ways. The coke oven industry at the moment had coal to itself but in the future would be looking to other methods.

Ozone and Engine Knock

Research at the Bureau of Standards

OZONE has been found to be more potent in causing detonation, or "fuel knock," than tetraethyl lead is in suppressing it, according to the results of research carried out by the United States Bureau of Standards. As little as two thousandths of a per cent. will cause an increase in detonation equal to that occasioned by substituting regular gasoline for premium gasoline. By using somewhat higher concentrations—up to one hundredth of a per cent.—regular and premium gasolines were made to knock as badly as does kerosene. These concentrations of ozone, however, had no effect on power or efficiency when the compression of the engine was such that no detonation occurred. While the average motorist is more interested in suppressing detonation than in obtaining it, and while stratosphere flights are still too far in the future to cause concern over the possible effect of ozone in that region on the engines used, this discovery gives automotive and petroleum technologists a new tool with which to study detonation and to test theories thereof. As ozone and tetraethyl lead have opposite effects of the same order of magnitude, a study of the action of ozone may throw light on the mechanism whereby tetraethyl lead suppresses detonation.

The Production of Oil from Coal

Its Technological and Political Aspect

THE technological aspect of the production of oil from coal dealt with, and the relation of politics to this problem, was discussed in a joint paper by Dr. W. R. Ormandy and Dr. J. Burns, read at a meeting of the Institute of Marine Engineers held in London on October 17. It was emphasised that it is no longer sufficient to talk about oil in a general sense but it is necessary to take into consideration the quality of the products, which quality is expressed in certain physical characteristics which are becoming daily of greater importance.

As regards fuel oil, the heating value, sulphur content, freedom from ash and water and viscosity are the main governing factors. In Diesel oil for big slow-running engines a fairly wide range of oils may be usable, strict limits however being placed on water, sulphur and ash content, but for the smaller high speed compression-ignition engine the demands of the users are becoming even more stringent. Viscosity, ash and sulphur are still of importance but the chemical composition is beginning to play an ever more important role. Again, it is becoming more evident that with the growth of the small high speed compression-ignition engine we are likely to have a large range of fuels distributed on the market, which fuels will be sold to a stringent specification are already in force. The octane-number of a fuel for spark ignition engine has become one of the utmost important factors, and straight run petrols are actually being cracked in order to produce a considerable smaller volume of petrol but one having the desired higher anti-knock properties. These facts, it was contended, indicate the variations of specification in oils which modern conditions demand, and which the petroleum industry is able to supply. If oil from coal is to compete with crude petroleum products, such oil must be capable of competing on a similar specification basis.

Dr. W. R. Ormandy made some outstanding remarks on the manner in which industrial enterprise is liable to be hindered by political action, when speaking on " Oil from Coal " at a meeting of the Institution of Marine Engineers.

Difficulties Ahead

The present price of petrol in tank steamer lots is of the order of 3s. per gal. available for storage alongside British ports. At the present moment casing head spirit, which is of a very light quality and is used to mix with cracked spirit to improve the starting properties, is hardly different in price from the heavier spirit to which it is added, but there is a measurable difference in price if the spirit on offer has an appreciably higher octane-number than the average. Oils suitable for small compression-ignition engines and for use in gasworks for enriching water gas are, if anything, dearer than petrol, whereas fuel oil is being put into bunkers at about £2 per ton. These exceedingly low prices are due, in the main, to the wasteful over-production which is now taking place all over the world.

In so far as any process, using coal as a raw material, produces oil, there are grave difficulties in stating whether a process will be economic when the prices of the imported materials with which the coal product is competing, are liable to sudden and considerable changes. The difficulty of the situation is enhanced by the fact that in almost all countries there are internal taxes which, in so far as they increase the cost of the petroleum products, are likely to make the possibilities of the home products appear rosier than they are in fact. In this country, petrol which costs about 3d. per gallon ex store, is subject to 8d. per gal. tax, and fuel oil, for most purposes, is subject to a tax of about £1 per ton. The Government may forgo part or whole of the tax to encourage home industry, but, Dr. Ormandy said, it is a risky matter to endeavour to build up a large industry on such an unstable foundation. To-day, the scientist and the technologist can state within comparatively narrow limits the cost of the distillation of coal and the capital cost of the plant employed, whether for high temperature, medium temperature or low temperature carbonisation, but unfortunately these figures, under the economic conditions of to-day, are of comparatively little value, for the incidence of taxation on all or some of their products may completely alter the possibilities of a process.

Discussing high temperature distillation, Dr. Ormandy spoke of benzol production not being subject to the 8d. petrol tax, but added that should this be imposed or should the price received for motor benzol fall below 5d. or 6d. per gal. it is a question whether the recovery of this product from the gases would be continued. Speaking of creosote oils, he said these are at present being produced at a rate in excess of the requirements of the legitimate market. If the steel industry were to grow to its former dimensions, with the consequent requirements for larger amounts of metallurgical coke, there would probably be a still greater excess production of a number of products, and it would appear that the hydrogenation of these liquids for the production of a high grade motor spirit might be regarded as the most likely means for upgrading and marketing the products. Certainly there would be no attraction to either the gasworks or the coke ovens to sell their products for use merely as a fuel in competition with the petroleum oils at the price of £2 per ton.

Referring to low temperature distillation, Dr. Ormandy said this has been proved, on a commercial scale, to be capable of being run at a profit, but this was on an exceedingly small scale having regard to the size of the fuel industry generally. Although the amounts of motor spirit and heavy tars produced are greater in the case of low temperature distillation, nevertheless here again the liquid products of the treatment must be regarded as by-products and the rate of their production measured by the growth of the industry itself. By dealing with hydrogenation, it was claimed that the hydrogenation of coal cannot be economically carried out to-day, if the end product is to be fuel oil, and it was equally evident that the margin for the production of the more volatile petrol substitute is very narrow. In other words, said Dr. Ormandy, this is another case where the comparatively accurate knowledge of the scientist and technologist is of little avail in the face of changes brought about by political means for national ends.

Confidence Shown by I.C.I.

It can definitely be said, continued Dr. Ormandy, that it is to-day possible to convert bituminous coal, brown coal or lignite into liquid products having a wide range of boiling points, by means of hydrogenation. It has been widely stated that the hydrogenation of coal can only be carried out on a very large scale. At first, the medium scale for economic production was placed at 220,000 tons of petrol per annum. In South Africa, on the other hand, it was claimed that economic production could be obtained at 20,000 to 50,000 tons per annum. The present scheme, which is being developed by Imperial Chemical Industries, is said to be on the scale of 100,000 tons per annum. As it is probable that the largest unit which can be employed in any plant will have a throughput of about 50 tons per day of coal-oil mixture, surprise may be expressed that no attempt has been made to put up, say, a three unit plant with two units in action and one in reserve, in order that quantitative figures from industrial scale plants might be obtained. On the other hand, the fact that Imperial Chemical Industries are prepared, based on their own experimental work and that of their co-operators in Germany and America, to put down such

a large unit in the first place is a measure of their confidence in their ability to overcome the technical difficulties which always arise in the first commercial unit of any plant.

Referring to the hydrogenation of high and low temperature tars, Dr. Ormandy said the question whether the coke oven and gas industries should adopt the principle of hydrogenation is again dependent upon politics. If petrol is to continue at its present low price of 3d. per gal. it is obvious that the hydrogenation of tar could not have a profitable issue apart from political interference.

Pig-Headed Stupidity of the Collieries

In some additional remarks, Dr. Ormandy said that the colliery companies have shown more pig-headed stupidity than any people in any branch of industry in the country. They would not work together and the Government had had to force a quota system upon them. The position was that the big modern collieries, which were making money, said they would not buy up the smaller collieries which were in the hands of the banks, because they suspected these smaller collieries would some day close down and then the larger ones would get the business for nothing. Speaking again of smokeless fuel, he said that the low temperature carbonisation industry was proceeding on the lines of desiring to displace 40 million tons of household coal now supplied by the collieries by purchasing from the collieries very cheap slacks at a price below the average cost of production and treating it to provide a smokeless fuel at a price not far short of that charged for household coal. The average cost of production of all coal in the last recorded period, as published by the Department of Mines, was 13s. 9d., whereas the average price received was 13s. 5d. so that the collieries were making a loss of 4d. per ton.

A Possible Cycle of Events

It was quite true that there were arguments, which could not be met, in favour of smokeless fuel, but were the colliery people going to view with great joy the sale of non-caking slack at a very low price in order that it might be treated and sold in competition with their own household coal? The obvious thing seemed to be that the price of these slacks would rise, which, in turn, would have an effect upon the price of the caking slacks and then there would be a howl from the blast-furnace people because the price of metallurgical coke would go up. Therefore, it seemed to him that there were the greatest prospects for hydrogenation and the conversion of coal into first-class petrol. He doubted whether it would be possible to hydrogenate coal to produce a Diesel oil because the very characteristics of hydrogenised coal, which made the product so suitable for the spark ignition engine using petrol, were the very characteristics which ruined it for the purposes of Diesel engine oil.

In a reference to the patent taken out by the Cunard Company following the experiments with coal and oil mixtures on s.s. "Scythia," Dr. Ormandy drew attention to the claim that if coal ground to a 200 mesh is heated at a certain temperature in contact with oil there is a breaking up of the coal particles into many other particles very much finer than the original one, and in this way, of course, there was the production of a more or less really colloidal fuel inasmuch as the particles were very much finer than was possible by any grinding process. That was a line of approach which had been tackled both in Germany and America, but he was not aware of the existence of any commercial plants having been erected containing the type of cracking arrangements which would be suitable for this new chemical engineering problem. Nevertheless it was a line of attack which was well worth following up.

Experiments on Colloidal Fuel

Mr. P. C. POPE (secretary of the Institute of Fuel) discussed coal-oil mixtures and pointed out that this process involves the use of certain types of oils as stabilising media in conjunction with coal pulverised to a certain degree of fineness so that it will remain in stable suspension. Mr. Hurrell, Colonel Bristow and himself, however, had been experimenting on the production of a so-called colloidal fuel or oil-coal mixture by purely mechanical means, and the conclusion had been reached that by grinding the coal finely enough there was no need to use special oil for stabilisation because it had been found that coal could be suspended in any oil for a sufficient length of time to be of practical service. Speaking of the prospects for such a fuel not only for marine purposes but also on land, Mr. Pope remarked that the Cunard Company consumes from 800,000 to 1,000,000 tons of oil per year, but very little of it was obtained from tanks in this country. If, however, it was possible to provide oil-coal mixtures of a suitable character possibly a great many of our steamship companies who bunkered abroad with oil—where it was cheap—would bunker in England with oil-coal mixtures provided the price was sufficiently reasonable.

Wild Cat Schemes

Mr. JOHN ROBERTS said a number of wild cat schemes were being put before the public in connection with oil from coal, and only quite recently there had been headlines in the newspapers with regard to a mad-brained South Wales scheme. South Wales was the last coalfield in this country that ought to entertain putting up ten low temperature plants at once, but the public was being asked to subscribe £7,000,000 to put up ten low temperature plants and a hydrogenation plant. In his view it was extremely stupid to do anything of the kind. At the present time we were importing oil of one kind and another of a value of £40,000,000 per annum. Some of that, of course, was essential to industry here, but he wished to emphasise the point that through having to maintain 300,000 unemployed miners on the dole the country was paying for the equivalent of 90 million tons of coal per annum which it was not getting.

Mr. W. HAMILTON MARTIN said that one thing that had emerged from certain extensive investigations on fuels made from coal-oils was that they are not so satisfactory as those made from oils in which the proportion of coal-oil does not exceed 20 per cent. From this it would seem that the ideal home-produced fuel, *i.e.*, coal suspended in 100 per cent. coal-oil, is, for several reasons, not commercially attractive in spite of its national appeal and therefore imported oils will still be likely to bulk largely in whatever supplies ultimately reach the consumer in this country.

The Government and the Miners

Dr. ORMANDY, replying to the discussion, expressed the view that the oil industry would be better off if it did not try to capture that portion of industry which legitimately, under the present economic conditions, belonged to coal. There was, he said, a stupid lack of co-ordination among nations not only as regards armaments but also as regards the more peaceful production of coal. When proper economic price prevailed a great deal of business now done by oil would go back to coal. As regards what Mr. Pope had said about fine grinding, which gave stability without the use of artificial stabilisers, it was obvious that if grinding was fine enough it was possible to do what had been suggested, but it was all a question of cost. He had seen coal suspended in water, as had been done by Plausen. The cost of grinding went up as a straight line function, but there was a curve at the end of it and the chances of Mr. Pope making the fuel he had mentioned economically depended on what part of that curve his figures dropped. There was a great deal of force in what Mr. Roberts had said as to the 300,000 unemployed miners and the 90 million tons of coal, but a point to be borne in mind was whether that 90 million tons of coal could be sold if it were produced. It might be that the Government could get that coal produced at the present cost of the dole, but if the Government then said that coal had, for all practical purposes, cost it nothing and proceeded to put it on the market at very low prices—in other words subsidised coal—the rest of the coal industry would be worse off than ever. The whole trouble was that the coal industry would not pull together.

Referring to the question of oil-coal mixtures, Dr. Ormandy said that whilst undoubtedly there must be a minimum size of particle it was all a question of the cost of grinding. As to the amount of ash in oil for Diesel engine purposes, he believed the Diesel Engine Users' Association fixed the amount at 0.2 per cent. At the same time there was the possibility that the percentage of ash was not of such vital importance as was generally considered.

Fruit and Vegetable Canning

Recent Progress in Machinery and Processes

THE opening meeting of the 1933-34 session of the Chemical Engineering Group was held at Burlington House, London, on October 12, when Mr. George Cadbury, chairman of British Canners, Ltd., dealt with the canning of fruit and vegetables. The chairman of the Group, Mr. W. A. S. Calder, presided.

The growth of the canning industry in the past five years, said Mr. Cadbury, had shown a phenomenal development. The output in 1927 totalled 7,840,000 cans of fruit and vegetables; in 1932 it reached at least 50,000,000 cans. At the same time the imports of canned fruits and vegetables had increased in volume by 15 per cent. during this period, although the value of the imports had decreased by 10 per cent. The total *per capita* consumption per week between 1927 and 1932 had only increased from 2d. to 2½d. in this country, but consumption in the United States was 7d. per week *per capita*. The tin plate industry and the can-making industry had both been active in promoting the progress of canning and they had been backed by the Board of Agriculture which naturally had been anxious to foster the consumption of fruit and vegetables for this purpose. The consequence of this development had been, firstly, a shortage of suitable fruit and vegetables which put up the prices of raw materials and, secondly, a tremendous unloading of surplus stocks on the market, both home produced and foreign, which had meant sales at uneconomic prices. This general outline of the chain of events in this country, said Mr. Cadbury, was necessary to make it clear that further erection of plant and machinery is unlikely and inadvisable during the next year or two.

Tin Lacquering

Dealing with the question of food preservation generally, Mr. Cadbury said that the causes of spoilage are chiefly bacteriological, fermentation and the growth of moulds, although there were other causes, more purely chemical, such as internal breakdown of the fruits and the action of fruit acids on the metal container. The first essential, however, was to get suitable cans in which to preserve the fruit, these being now made in this country by automatic machinery imported from the United States. The tin plate was coated with a double layer of lacquer, stoved and then passed through the can-making plant which automatically produced an air-tight can with a rubber joint round the bottom and a soldered joint along the seam. The tin plating, of course, was done as perfectly as possible in order to cover the whole of the steel and the lacquering gave a further protective layer which was impervious to the action of fruit acids. In the ordinary unlacquered cans these fruit acids slowly acted on the tin and, if there were pin holes, more quickly on the steel, with the result that hydrogen was evolved and the tin dissolved by the acid, which was not only objectionable in itself from a health point of view but discoloured the liquid and bleached the fruit. Every effort was therefore made to get the lacquering as perfect as possible, but even the most perfect process was liable to have faults—either pin holes or cracks in the lacquer when the can was bent. For this reason the system of stamping lids by impressing code marks on them had been given up as it had been found that the lacquer inevitably cracked at the edges of these code marks and the contents were rapidly destroyed.

Outline of the Canning Process

Speaking of fruit canning, Mr. Cadbury said that after years of research, both in America and in this country, the technique had been perfected and it had been found essential to exhaust the fruit in the open can, to seal and to cook to an exactly predetermined point both as to temperature and time, which differs for each fruit and for various quantities and kinds of fruit. Only certain kinds of each fruit were suitable for canning and even then the quality must be carefully selected and graded, the residue going to pulp for jam making. The fruit is placed in the can with as little handling as possible, a syrup is put in by means of a syruping machine and the machine is then put through the exhaust box. This consists of a water-bath or steam-heated chamber and the cans are kept in the bath at a certain temperature long enough for all the air to be expelled from the interstices of the fruit. The can is now passed through a seaming machine when the lids are spun on at high speed (from 30 to 100 per minute) depending on the type of machine employed. After this the cans are passed through the cooker which may be a tank of boiling water in which they are immersed in baskets, or a continuous cooking machine on an endless rotating path in the water kept at an exact temperature by a thermostat. Finally the cans are passed through a cooler to stop the cooking process and are turned out into the store.

Pressure Cookers and Coolers

The amount of mechanisation in all the processes varies from the simplest plant consisting of tanks of boiling water and a hand-operated seaming machine—called a home canning set—to a fully automatic line in which the cans pass automatically from process to process, not being handled from the time they are filled with fruit to the time they are sent rolling down the chute into the stores below. As might be expected, it was added, the most highly developed plants come from America—the home of large scale canning—but other successful plants are made in France and Germany and during the last few years plants have been turned out in this country based, however, almost entirely on American practice. One of the problems which has faced canners has been the problem of a continuous pressure cooker for vegetables. Machines have been developed both in this country and in America which by means of transfer valves receive the sealed cans, transfer them to the interior of the machine, cook and deliver them over another transfer valve into the pressure cooler and thence by a further transfer valve to the open air. It is doubtful, however, how far these machines are a paying proposition owing to the very short period over which they can be utilised.

A new type of pressure cooker and cooler, however, has been developed which is vertical and occupies little space, consumes less steam, uses less labour and, it is claimed, ensures exact uniformity in processing and cooling. The machine is fed by a rotary valve so that the cans enter and leave the cooker and cooler through steam-tight valves. The cans are carried upright through the machine so that no shaking of the product occurs and as a result of the continous movement it is possible to use a shorter period of time for processing which improves colour and, at the same time, effects perfect sterility. As the cans discharge from the bottom of the cooking chamber they pass into the cooler where a pressure suitable to prevent distortion of the cans is maintained by the use of the column of water itself which maintains a hydraulic pressure so that the cans move upwards and are being cooled, the pressure externally being reduced equally as rapidly as the internal pressure.

A Question of Plant Cost

One of the greatest problems facing canners is how far it pays to put down elaborate plant for such a short season as we have in this country. The first fruits, for instance, which can be utilised are gooseberries and strawberries at the beginning of June; then there is a fairly unbroken run until September—the end of the plum season—when blackberries are over, or October if applies and pears are being dealt with. The longest possible run in any season is something like 4½ months and the plant has to bear all its overheads for a few months out of the twelve unless some winter products can be found to utilise the plant, a problem which so far has defeated most canners in this country. Vegetable canning is even more expensive, because whilst the brining and closing machines and retorts are in use for all vegetables, all other specialised machinery is only in use for a few weeks. The

problem arises, therefore, as to how far it pays to have really up-to-date labour-saving machinery with very heavy standing charges over a large part of the year, or to use rather more expensive labour which can be dispensed with as soon as the season is over. This applies to the whole of the plant in the canning factory which probably will be shut down entirely for six or eight months in every year.

Points from the Discussion

Dr. W. CULLEN pointed out that the impetus given to the canning industry had not really come from the farmers but from the tin plate people themselves, in the first place, because at a time of great depression in South Wales the tin plate industry looked around for some means of keeping their mills going. The canning industry was such an obvious one that it was remarkable that it had not been undertaken many years ago. He suggested the possibility of developing an export business in the canning of the unique fruits in this country, particularly Scotch strawberries.

Mr. C. EDWARD SAGE said that if there was one industry which called for the skill of the chemical engineer it was the canning industry. Speaking of the inspection of cans for imperfections, he said the sale of cans on the London market was on the basis of one in ten inspection. His own method was to go over the cans with a pin and it was surprising how often pin holes were found in this way. Lacquering was one of the most difficult problems which had to be solved, especially in connection with the canning of raspberries. One coat might be all right but when a second coat was put on it was something like putting a second coat of paint on to an old coat.

Prepared Paper Containers

Dr. S. G. BARKER mentioned a German machine which he had seen recently in which tin had been discarded altogether for the canning of fruit. In this case specially prepared paper was used and he saw this machine making these containers and filling them with butter, jam and other things at less than ¼d. a time. If some such material could be used it would get over many of the difficulties with tin. This particular paper withstood heat and acid, but it was not able to withstand alkali.

Mr. G. W. CADBURY (son of Mr. George Cadbury) said he was on the National Marks Committee which was actively pursuing the question of standards in the canning industry, which included such matters as colouring, weight of fruit, size of can, adequate lacquering, density of syrup and even cleanliness in the factory, so that whilst the National Mark system was primarily a marketing idea it was really a standardisation scheme. In any industry, however, it was very dangerous to introduce standards too quickly and it should also be born in mind that the National Mark Committee had only been in existence for three or four years. It was generally agreed that the system of sampling at the present time was inadequate, but the work was going forward on organised lines working from the point of view that the type of vegetable and fruit required for canning must be specially grown from special seed and must be controlled at all stages of its production and subsequent use in the factory.

Stamping the Lids

Mr. A. SAMSON said there was a danger of some misapprehensions creeping into the discussion. For instance, it was stated by Mr. Cadbury that stamping of the lids had been abandoned because it damaged the lacquer. As a matter of fact this stamping was not damaging to the lacquer if it were carried out with proper care. Lacquers were far more elastic than might be imagined and he had seen stamping to a depth of two or three inches without damaging the lacquer.

Major H. J. W. BLISS said he had been impressed by the fact that having taken a great deal of trouble with the tinning of the plate, the canners at present used india rubber at the bottom of the cans and also had to reinforce the tin plating with two layers of lacquer. Apropos of Dr. Barker's reference to paper, he asked whether tin plate is the only possible basis for cans if it were necessary to use two coats of lacquer. Was it not possible to use iron treated with one of the numerous anti-rust processes or iron that was merely cleaned and not lacquered? Again, he inquired why it was necessary to use sugar solutions for canning fruits having regard to the fact that fruits can be quite satisfactorily bottled in water only.

Major L. J. BARLEY asked if developments were taking place in quick freezing of fruit so that it need not be canned immediately it was picked. He suggested that the cost of this might not be more than 1d. per lb. and would enable the period of time during which the canning plant was in operation to be extended by being able to draw upon the stored fruit or vegetables so frozen. Commenting upon the point that the whole result of canning development must be a tremendous improvement in the standard of living, he suggested that not only should we aim at the consumption of very much more canned food per head of population in this country but at the exchange of what might be called exotic foodstuffs between all countries in the world, each country exchanging foods which it was able to can best with similar products from other countries.

Quick Freezing Methods

Major K. D. BROUGH (Vale of Evesham Fruit Canners, Ltd.) said that freezing had been tried in this country but it was not possible to keep the fruit and vegetables in that condition for a sufficient length of time to justify the expense. Moreover, it required an enormous amount of storage and again the cost was too great. It was impossible to store fruits and vegetables for more than ten days or a fortnight at about 29° F., and, therefore, it would not be within the bounds of possibility to maintain a regular supply during the winter. As to colour in canned vegetables, the original colour was of course due to chlorophyll and that was broken down in the heat process. The amount of colouring put in to make up for this was only a small quantity and it was a perfectly safe vegetable colouring. As to preserving fruits in bottles in water, sugar acted as a preservative in a can. Finally, on the question of lacquering the cans he said this is solely for the preservation of the colour of the food. Actually fruits could be preserved more easily in cans without any lacquer at all, but owing to the acid reaction between the metal and the contents of the can which gave rise to nascent hydrogen, the natural colour broke down. In the case of uncoloured fruits such as golden plums it had been found best not to use any lacquer at all.

Alternatives to Tin Plate

Mr. CADBURY, replying to the discussion, said it would be an extremely difficult matter to use paper, as suggested by Dr. Barker, for fruits and vegetables, because the cans used for this purpose received very severe punishment in the processing and it would be very difficult to find a paper container to stand up to this. Personally, he believed it would be a long time before it would be possible to substitute paper for tin. Cellulose had been tried, but not very successfully, and although certain manufacturers were at the present time making cellulose lids, the advantage of which, of course, was that the contents could be seen through the lid, these were very much more expensive although they might be adopted for display purposes. Aluminium and various other metals had been tried but none of them had been really satisfactory because they could not stand up to the sealing machine when the ends were rolled on. Generally speaking, it seemed to him that the metallurgist had a long way to go before he could find a satisfactory substitute for the tin plate container.

The bottling of fruit in water was only a sterilising process, and the fruit afterwards had to be cooked before it could be used for the table. There were also other reasons for the use of syrups in cans, one being that it helped to hold up the fruit and prevent it sinking to the bottom of the container. It also helped to maintain the flavour of the fruit in a far better manner than bottling. Quick freezing, for the purpose of storing the fruit in the factory before canning, had the effect of destroying the substance of the fruit. It seemed to break up the surface and when it was subsequently canned the fruit was liable to lose its shape and go into a "mush." That was an important reason why quick freezing could not be adopted.

An Outline of Synthetic Resin Formation—II.

By A. E. WILLIAMS, F.C.S.

LAST week the author dealt with the furfural, phenol-furfural, ammonia-furfural and phenolic-formaldehyde resins. The following notes cover the carbamide-formaldehyde, coumarone, glyptal and vinyl types. Under the heading of carbamide-formaldehyde resins are also included thiocarbamide-formaldehyde resins. The action of formaldehyde, CH_2O, on carbamide, $CO(NH_2)_2$, gives resins of varying properties, according to whether a neutral, acid, or alkaline medium is employed. Similar results are obtained when thiocarbamide, $SC(NH_2)_2$, is substituted for carbamide; with the exception that the former substance usually produces resins of low electrical insulating value, but which may be successfully moulded for a variety of other purposes.

If carbamide and formaldehyde are heated together with an alkaline catalyst, and the mixture afterwards neutralised with an acid, a pale brown resin separates out, which is soluble and may be used for varnish purposes. After drying and further heating this product is rendered impervious to acids and alkalies, and is also generally both insoluble and infusible. In this condition it may be moulded for electrical or other purposes. When an acid catalyst—such as sulphuric acid—is employed, a darker coloured resin results, which is often more brittle than the alkaline product. Although it may be moulded for some purposes, it is not altogether suitable for electrical insulation work on account of its low dielectric strength.

Carbamide Formaldehyde Resins

Resins of this class, manufactured under neutral conditions, have the widest application. In this respect the thiocarbamide-formaldehyde resins have been developed to a high degree by the Beetle Products Co., Ltd., who specialise in the making of domestic utensils and ornamental goods from the resin. Their process consists of a blowing of air, or of an inert gas, into the mixture of thiocarbamide and formaldehyde, to remove such impurities as formic acid, etc. The moulding of the resin and filler to form the required articles, such as cups, saucers, etc., is carried out in the usual type of steel mould at a temperature of 140° to 145° C. These moulded articles are unaffected by temperatures up to 120° C., and successfully withstand the action of all domestic liquids.

The Pfenning-Schumacher-Werke Ges., of Germany, has protected a process in which use is made of sulphocyanides in carbamide-formaldehyde resin production, with the object of speeding up the polymerisation reaction of resinification. Sulphocyanides of metals or mixtures thereof are added to moulding compositions, comprising carbamide-aldehyde condensation products, whereby polymerisation in the hot press is promoted, and the mouldings improved. The sulphocyanide may be added at any stage in the process up to the time of condensation taking place; but it is preferably added to the moulding composition while still in a solid powdered form. The amount added may vary according to the character of the moulding composition, but from 0.5 to 2.0 per cent. is usually sufficient.

Coumarone Resins

These resins are not in general use for moulding work, chiefly on account of their brittleness. They, however, are largely used in the varnish industry, and for the manufacture of printers' ink. Their chief source is the heavy benzol from coal-tar, boiling between 150° and 200° C. Usually coumarone (b.p. 172° C.), and indene (b.p. 182° Co.), both light oily liquids from benzene, form the fundamental materials for resin making. The process consists of collecting the distillate which comes over between 170° and 184° C. from heavy benzol. This is then polymerised at a definite temperature, by the addition of sulphuric acid, followed by neutralisation with caustic soda, and finally distillation.

The characteristics of the coumarone resins are governed largely by the temperature of polymerisation, and the amount of sulphuric acid employed. With an excess of sulphuric acid, and a relatively high temperature, the resin formed is both insoluble and infusible, but at the same time is usually too brittle to be moulded. With smaller quantities of acid the resin is frequently too soft to be moulded, as well as being soluble in various solvents, which renders it unfit for moulding purposes. So that the varnish industry, etc., is the main outlet for this type of resin. Possibly future research will produce a satisfactory coumarone resin that can be moulded.

Glyptal and Vinyl Resins

Imperial Chemical Industries, Ltd., manufacture a synthetic resin termed glyptal, from glycerine, glycol and phthalic anhydride. Glyptal has properties not usually found in other synthetic resins, e.g., it may be used for the bonding of mica products, for which purpose other resins are unsuitable on account of the smooth surface of the mica. It does not become brittle when subjected to very high temperatures, which is a distinct advantage for many purposes. This product is applied extensively in the manufacture of laminated sheet, in which cloth and paper is coated with a layer of the resin and subjected to pressure. It is also a valuable material for admixture with rubber to prevent scorching.

A number of processes for the manufacture of vinyl resins, from mono-vinylacetylene, $CH : C.CH : CH_2$, have been protected in the last few years. As yet, however, this class of resin is more expensive than the better known types. Other resins which, so far, have not been developed on a large scale include products from acetone and formaldehyde; acrolein (from glycerine) resins, etc. The resinous mass of the composition, $C_5H_{10}N_2S_2$, resulting from the interaction of formaldehyde and ammonium sulphate is also of interest as a potential source of synthetic resin.

Filling Materials

Both fillers and pigments used in moulding mixtures influence greatly the electrical strength of the finished article. At normal temperatures the electrical strength of synthetic resins ranges usually from about 150 volts to about 500 volts per millimetre at $\frac{1}{8}$ inch thickness; and according to the type of filler added to the resin, the electrical resistance of the mixture may be lowered or raised. Wood meal is the filler mostly used in electrical mouldings for use at ordinary temperatures, the proportions being about equal parts of meal and resin. For high temperature work the filler is often china-clay, or slate dust.

The white chrysotile variety of asbestos is often used in certain types of moulded compounds. It is particularly advantageous where high dielectric strength is not essential, but at the same time a good heat resistance is required. The chief disadvantage attached to the use of asbestos is that the insulation value is liable to be considerably reduced, due to small amounts of metallic particles often found in the asbestos fibre. Asbestos is also liable to absorb both acid fumes and steam, thus lowering its insulating properties. To obtain the best electrical strength the moist fillers are dried in vacuum band dryers immediately prior to incorporating with the resins. The resin and filler mixture is then passed over hot mixing rolls, which are heated by steam to a definite temperature in accordance with the kind of resin under treatment. This mixture is then finally ground into powder, packed in air-tight cases, and sold to the moulding companies.

Materials such as iron oxide, manganese oxide, etc., are in use to impart various shades of colour to the mouldings, the colouring matter being added usually with the filler. A jet black colour is given to the moulding powder by the use of nigrosene dye; for the same purpose carbon black is often employed for other than electrical mouldings.

IT is reported that De Nordiske Fabriker, Oslo, is constructing a large electrolytic hydrogen plant in Italy for a manufacturer of synthetic ammonia. The plant will utilise the negative peaks of the load curve of the hydroelectric plant, thus permitting large-scale production of hydrogen during summer months when the public demand for electricity falls to a low level.

Dechlorination of Water by Acticarbone-Hydra

Improved Technique in Water Purification

It has been known for some considerable time that when a supply of water for domestic use has a bad taste or smell, this may be eliminated by passing the water through a sufficiently thick layer of ordinary wood charcoal. This method of purification, although simple, has not been developed on account of the very short life in purifying power of the charcoal used. By special processes, however, it is now possible to prepare special grades of activated carbon, such as Acticarbone, having an extremely high absorptive power for all matter which may impart to water a bad taste, colour or smell. The porous structure of this material also confers a high power of catalysis, and it is, therefore, extremely efficient in eliminating any excess of chlorine used in sterilisation.

Activated carbon is the best purifying material at present known for deodorisation and dechlorination of domestic waters. It has revolutionised the technique of sterilisation of water by chlorine.

A special carbon, Acticarbone-Hydra, is produced at Villers-Cotterets and at Vaux in the two most important works manufacturing active carbons in France. These factories jointly belong to Carbonisation et Charbons Actifs and the Société de Recherches et d'Exploitations Pétrolifères, who are represented in Great Britain by Price, Stutfield and Co., Ltd.

Elimination of Chlorine after Sterilisation

It is well known that the scarcity of good sources of supply of drinking water has made it necessary to make more and more use for domestic purposes of surface waters, shallow well waters and waters of rivers, lakes, etc. These waters always have an unpleasant taste, are strongly contaminated and rich in organic matter. The methods of sterilisation at present applied (treatment by chlorine) give imperfect results and demand a special technical control of the highest order. Treating water with extremely small quantities of chlorine, does not improve the taste, nor can it give complete safety in the treatment of highly contaminated waters. It is greatly preferable and also much simpler to treat these waters with an excess of chlorine (1 or 2 grams of chlorine per cu.m.). This treatment can be carried out automatically without any need of special control, and makes absolutely certain that the micro-organisms are completely destroyed. It is, however, necessary to eliminate afterwards in an economic manner any excess of chlorine, which will impart an unpleasant taste to the water. It is in this direction that the purification of the water by means of acivated carbon finds a wide application. All that is necessary is to pass the water, which has been completely sterilised by an excess of chlorine, through a layer of activated carbon of calculated thickness, to free it completely not only from chlorine, but also from all other substances that may give a bad taste or colour to the water. This method, which is clearly the most reliable, the most efficient and the simplest, is also the most economic, for, on account of its safety, it allows of the suppression of the control of the process by a specialist staff, which up to now has been a heavy charge against the process of sterilisation. On the other hand, the older chemical methods of neutralisation of the excess of chlorine by hyposulphite, etc., call for a close supervision and have, evidently, no possible action on the bad taste of the water, which is, on the contrary, completely and simultaneously removed by Acticarbone-Hydra.

Elimination of Chlorine

Contrary to what might be expected, the elimination of chlorine or hypochlorite in excess by active carbon is not a simple phenomenon of absorption. The dissolved chlorine is not fixed by Acticarbone, but in contact with water and carbon is converted into hydrochloric acid which immediately reacts with the calcium compounds present in the water, to give traces of calcium chloride. The sodium hypochlorite is converted into sodium chloride. The chlorides of calcium and sodium so formed are soluble salts which are simply added to the salts already present in all natural waters, and the quantities produced are too small to have any effect on the taste. The nascent oxygen, according to the circumstances, will remain dissolved in the water, or combine with the carbon to form carbon dioxide. The carbon acts as a catalyst to this reaction in making it much more rapid. A few seconds of contact are sufficient to ensure the transformation. In addition, organic matter possessing taste or colour is absorbed by the carbon and is periodically removed by the special processes of regeneration. The activated carbon, Acticarbone-Hydro, which is in the form of small even grains, is used in layers of variable thickness as a simple filtering medium in reservoirs or tanks similar to those used for sand filters. The reservoirs can if necessary operate under pressure in closed circuit and they may be constructed of reinforced concrete or iron. For the treatment of certain types of industrial waters, the makers of the activated carbon recommend Acticarbone in a powdered form. This is mixed, in an automatically regulated proportion, with the current of water to be treated and is afterwards separated by ordinary sand filters which are generally present in any industrial waterworks. The great permeability of the layers of granulated carbon allows of high speeds of filtration being obtained without any considerable loss of pressure. With Acticarbone-Hydra of normal calibration placed in a layer of ½ metre thick, the loss of pressure for a speed of 1 cm. per second will be about 20 to 25 cm. A filter of 1 sq. metre in section will under these conditions treat about 900 cubic metres (say, 180,000 gal.) of water per 24 hours.

Duration of Activity

As these special activated carbons retain the bulk of the organic matters and impurities in suspension, it is best, in order to avoid stopping up the pores, to pass the water first through an inert filtering layer such as sand. Even then it will be found that, in spite of all precautions, small quantities of impurities will accumulate after a long period of use and the activity of the carbon will thus slowly fall off. This loss of activity is, however, extremely slow. The makers state that Acticarbone will last for several years if the waters to be treated are fairly clear. Moreover, when the activity has decreased, it is easy to regenerate the carbon by simply washing in water in a counter-current, by steam treatment, or by washing with an alkaline solution. Filters are equipped so as to avoid all contamination of the carbon which always remains completely sterile. Moreover, after several years of operation, if Acticarbone has definitely lost its activity, the makers can regenerate the material economically in their own factories.

The use of activated carbon, Acticarbone-Hydra, in water purification adds only a fraction of a penny per 1,000 gal. to the cost of treatment. This cost includes the capital cost of carbon, the expense of installation and the expense of regeneration and operation.

Magnesium Sulphate in the United States

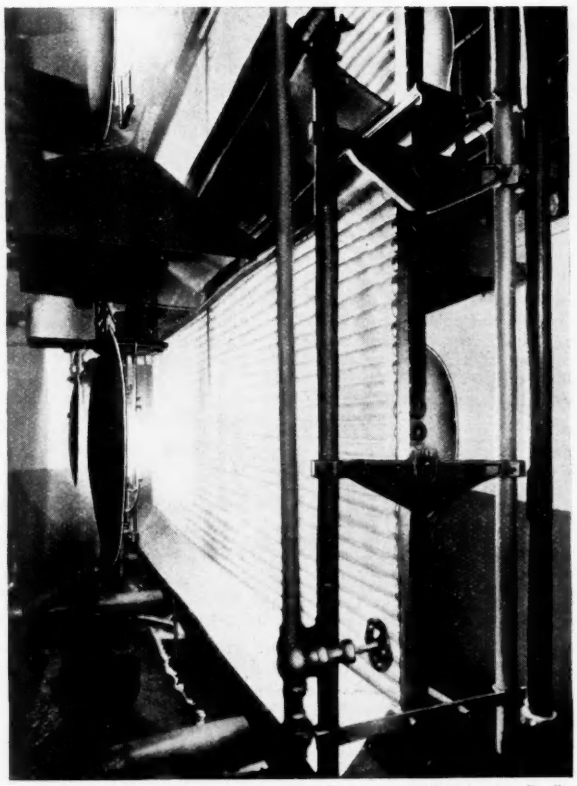
The growth of viscose rayon production in the United States accounted for a sharp increase in the output of magnesium sulphate during 1929 as compared with previous census years. The gain was fairly well maintained in 1931, the latest census year, but imports in that year and subsequently have contracted. Particulars of the quantity of Epsom salt available for consumption in the United States for recent years show that production increased from 20,676 short tons in 1923 to 34,340 tons in 1931. Imports in 1923 amounted to 7,228 short tons and in 1932 the total was only 4,824 short tons.

Ultra-Violet Radiation in Industry

The Carbon Arc as a Source of Active Light

ULTRA-VIOLET radiation, sometimes in conjunction with visible light, is used at present in a large number of industrial processes. It is used in the textile industry for the bleaching or grassing of the best quality of linen, in the petroleum industry to remove the bloom from lubricating oils, in the leather industry for the final step in the manufacture of patent leather. For the sterilisation of water for public supply, the manufacture of various beverages, and, through its bactericidal action in the preservation of food, the ultra-violet ray finds wide use. Artificially-generated ultra-violet is also used in the food industry to increase the vitamin D content of foods and, in some cases, to improve flavour, whilst various pharmaceutical preparations are likewise subjected to artificial ultra-violet radiation in order to secure certain specific properties, such as the formation of vitamin D or substances having similar biological effects.

Due to its wide range of flexibility in character of radiation and its high efficiency in ultra-violet production, the carbon arc has proved particularly well adapted to such processes and, in many cases, has replaced other types of irradiating units. Sixty-six carbon arc lamps, having a total demand of over 200 kW are used by one large manufacturer to improve the quality of tobacco by elimination of undesirable ingredients. One of the drums, in which the product is exposed to 5 kW of ultra-violet radiation from these powerful arc lamps, is shown in one of the accompanying illustrations.

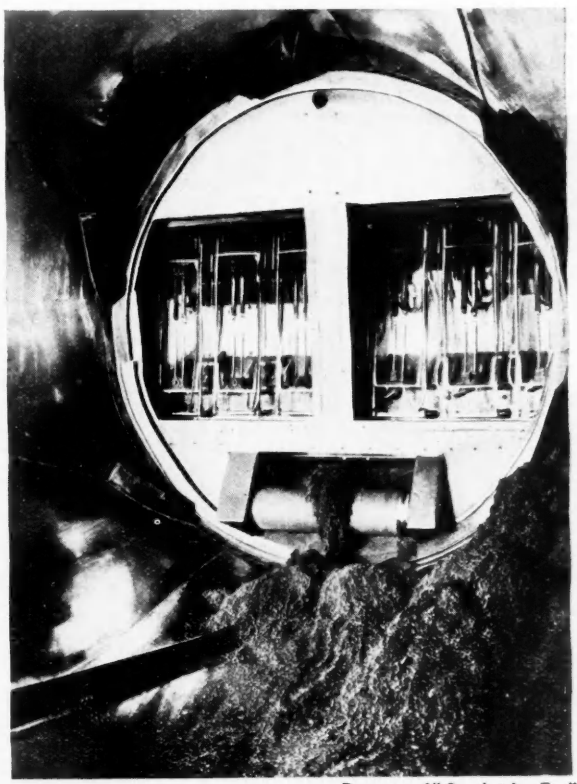


By courtesy of "Oxy-Acetylene Tips"

Carbon Arc Apparatus for the Irradiation of Milk.

Many materials, formerly tested for durability or processed by exposure to sunlight, are now being exposed to the rays of these carbon arc lamps. Processing is greatly accelerated by the increased intensity of ultra-violet radiation thus made available and the cost of the product is substantially reduced. Furthermore, the reliability of such operations is enhanced to a large degree by substituting a light source of uniform intensity and quality for the uncertain strength and variable quality of natural sunlight. Applications of this character include the testing of paints, varnishes, dyes and dyed textiles, wall-paper and other coloured printed matter, ink, rubber, and laminated glass.

Other uses of ultra-violet radiation, not yet extensive but which have been discussed occasionally, include the production of scrim oil in linoleum manufacture, the final treating of oil-cloth to remove stickiness, the bleaching of oil for food and technical uses, the synthetic manufacture of rubber from unsaturated compounds such as vinyl chloride, and the manufacture of chlorinated solvents from chlorine and hydrocarbons, such as chloroform. Many laboratory reactions are known in which ultra-violet also plays an important part. A large number of these offer possibility of industrial application. The research laboratories of two large universities have installed large carbon arc lamps to study industrial applications of ultra-violet radiation. The facts already mentioned and the extensive research now being conducted point to a rapidly growing use of ultra-violet in industrial processes.



By courtesy of "Oxy-Acetylene Tips"

Undesirable Ingredients are removed from Tobacco through the agency of Ultra-Violet Rays.

Petroleum Substitute for Linseed Oil

A NEW method devised recently by the Institute of Paints and Varnishes at Yaroslavl concerns the use of petroleum residues instead of linseed oil. Soviet paint plants have been using tens of thousands of tons of linseed oil annually, and its replacement by petroleum products will result in a considerable lowering of production costs. The first plant to use the new method was the Workers' Victory Paint and Varnish Factory, at Yaroslavl.

Letters to the Editor

British Business Methods

SIR,—I have always desired to sell British goods and have a great liking for British people, and if I venture to offer some criticism of the ways and manners of your manufacturers with regard to continental trade, I hope your readers will realise that I only do so out of a genuine interest in the matter. I have been more than 40 years in business and have introduced a great many British articles in my country, but can safely say that it is, generally speaking, very difficult to obtain goods from your country. Recently I wanted to replace articles hitherto exclusively imported from elsewhere by those of British make. Though I was convinced that these goods were made in your country I did not know a single manufacturer. They do not advertise as they should in trade papers, neither do they exhibit at the British Industries Fair which I visit regularly.

I asked a London manufacturer, with whom I have done business for many years, to give me the name of a good firm. He replied that he had forwarded my inquiry to X and Co., in Y town, and felt sure that this firm could supply all I wanted. I did not get a reply from this firm, though, as I say, I was recommended by a well-known firm in London. This is only one of the many examples I can give that British manufacturers do not reply to inquiries, though I, at least, always add references.

I am told that many British manufacturers do not exhibit at the British Industries Fair because they think it much better that buyers should visit their London showrooms. How these buyers have to find the right showrooms, I am not told. Moreover, may I say that a buyer can "do" the British Industries Fair in one or two days, but requires many weeks to visit a number of showrooms situated in all parts of London. My own purpose in visiting the British Industries Fair is to find the makers, get an idea of their goods, and if these are of sufficient interest, then to look up the firm in the showroom.—Yours respectfully,

Amsterdam (Holland).) G.S.

Questions and Answers

Technical, Industrial and General

204. HYDRATOR.—A firm of engineers in England wishes to know the name of anyone who manufactures hydrators of the type supplied by the Krister Co., of Chicago. This plant is used for hydrating burnt lime, and the capacity is about two tons of lime per hour.

The hydrator in this country which most resembles that made by the Krister Co. is the "Schultess," made by Edgar Allen and Co., Ltd., Sheffield. It works on precisely the same principle, but it is found that, for most English limes, it is not necessary to have so elaborate an arrangement as the Krister hydrator. The mechanical hydration of lime is by no means so simple as it appears, and before ordering a hydrator various tests should be made with the lime to ascertain the best conditions for slaking it and the time required. It frequently happens that such tests show that a very simple form of hydrator—much cheaper than either of those mentioned—will suffice, but the tests also show that, for some limes no mechanical hydrator on the market is satisfactory. A firm of consultants to the lime and allied industries with more than thirty years experience will be pleased to advise our inquirer and possibly save him much anxious thought and waste of money.

205. MAGNESIUM OXY-CHLORIDE.—Could you furnish the name and address of any firm or agent distributing magnesium oxy-chloride cement.

Magnesium oxy-chloride cement is made as and when required by mixing freshly calcined magnesia with a solution of magnesium chloride and allowing the resulting mass to set. There are no suppliers of the actual cement; the component materials can be purchased from any chemical laboratory suppliers.

The Dyeing of Loose Cotton

Continuous Machines in Soviet Russia

THE continuous dyeing of loose cotton on a large scale in the United States and Soviet Russia, was the subject of a paper by Mr. Joseph Brandwood at a meeting of the Manchester section of the Society of Dyers and Colourists, on October 20. Mr. W. F. A. Ermen was in the chair.

Mr. Brandwood stated that in considering the dyeing of loose cotton it was well to have in mind, first, the advantages of handling the material in this form. Its disadvantages were obvious, namely, the possible specking of yarns of other colours by the inevitable card room and frame fly and lint, and the loss of dyestuff caused by the colouring of waste and strips from the cards which had been dyed and which were of less commercial use than if they were undyed. On the other hand, when the loose stock was dyed it could be converted into cloth with the least possible amount of handling, and in the case of weft entirely without winding, since the dyed stock was ring spun direct on to the quills or bobbins for the automatic loom. In the case of warp yarn the handling and transferring from one form to another was less than in any other process with the exception of beam dyeing. The solidity of shade obtained from loose stock dyed material, if the dyeing was properly carried out, was exceptional, and the cloths had a bloom and life in the colour which could not be reproduced in yarn or piece dyed fabrics, doubtless due to the polishing effect of the cards and frames on the dyed fibres. In the production of mixture yarns and mock grandrelles the dyeing of loose cotton was almost an essential.

The author of the paper then described, with great technical detail, certain examples of continuous machines supplied to the United States and to Soviet Russia, in which the cotton was confined in a relatively thin layer, penetration being accomplished by pressure, and, inasmuch as the thin layer or lap had been formed for the dyeing, a squeeze press might be used for the elimination of the water before drying, replacing the hydro-extractor, and thus giving true continuity to the process. Soviet Russia, in 1930, installed a continuous machine which was at present the largest in the world, its production being 1,250 lb. of dry cotton per hour. The machine was a success from the start, and more than produced the guaranteed quantity of dyed cotton. The dyeing was excellent, and the condition of the dyed cotton seemed perfection. There was no hand labour required. The labour cost was about 0.01d. per lb. of cotton dyed.

Safety for Chemical Works Machinery

Adequate Protection and How to Procure It

SOME useful information of a practical nature regarding means for preventing accidents in the presence of power transmission machinery, disintegrators and mixing rolls, as found in the plastic and allied industries, was given by Mr. E. J. Wallace, manager of the accident prevention department of the National Employers' Mutual General Insurance Association, Ltd., in a paper read before the London section of the Institute of the Plastics Industry, on October 18.

It is important to note that shafting can sometimes be regarded as safe by virtue of position, for instance, when it is 8 or 10 ft. above floor level and is not approached by employees. Generally, however, it is safe to assume that all horizontal shafts, belts and pulleys should be enclosed on the sides, bottom and ends. Heavy or fast running horizontal belts should be enclosed even though they are some distance above the floor, especially if an employee works below the drive. Vertical and inclined shafts and belts should be enclosed in accordance with the following table:—

Distance from point to be guarded.	Height of guard.	Size of opening in guard.
Up to 4 in.	6 ft.	½ in.
4 to 15 in.	5 ft.	2 in.
15 to 20 in.	3½ ft.	3 in.

Projecting Ends of Shafting

Inasmuch as clothing catches more easily on the end of a shaft than on the shaft at any intermediate point, it is advisable to cut off or equip with a stationary protective casing every shaft end regarding of its location if it projects 2 in. or more beyond the bearing. If there is a keyway in the end of the shaft the protective casing should be installed where this projects. Provision should also be made to prevent a belt pulling down the shaft, should it "jump" the pulley, and increased use should generally be made of belt rests to prevent belts riding loosely on shafting.

When belts pass through a floor and where a guard is placed round a floor opening, a six-inch solid section of toe board should be placed at the base of the guard to prevent objects rolling or being kicked through the floor opening. Provision should be made to guard against friction due to the belt rubbing on the edge of any opening. It is sometimes advisable to place loose rollers so that if the belt rides to one side it will strike the roller and cause less wear and friction. This is considered better practice than facing an opening with sheet metal.

Collars should be of a safety type without projecting bolts, set screws or other dangerous projections, otherwise they should be suitably enclosed. Couplings should be guarded or enclosed, to remove all danger in case of accidental contact with the worker's body or clothing. Set-screws, regardless of their location, should be countersunk or of the headless-screw type.

Construction of Metal Guards

Relative to the construction of guards, metal is preferable to wood. Oil-soaked wooden guards increase the fire hazard. They are also more expensive to maintain. Metal guards are practically indestructible, wear better and are usually more substantial. Where guards are subject to acid fumes, wooden guards may, however, be necessary. Pipe or angle-irons are probably the best materials to be used in making the guard framework. The open spaces in the framework can then be filled in with sheet metal, expanded metal, perforated metal or wire-mesh. Do not think it an economy to use wire netting such as is usually found round fowl houses. It is frequently seen in a state of disorder within a week of erection, and replacement is essential if the requirements of the Act are to be met. Open seam tube is sometimes used, but if the frame is made of angle-iron the filler can be riveted, bolted or spot welded to it.

There are several general principles to remember when building guards for transmission machinery. In the first place the guard should be so designed and constructed that it will prevent all accidents on the part guarded, not only to employees while at their regular work, but also in case of accidental contact. Secondly, the guarded part must be easily accessible for oiling, inspection and repair; a removable section provided for this purpose should be hinged or otherwise attached to the remainder of the guard. Thirdly, the guard should not interfere with production; neither should it interfere with cleaning or sweeping around the machinery. Fourthly, the guard should be strong enough to resist injury and keep its shape.

Disintegrators and Mixing Rolls

Hopper feeding disintegrators and similar crushing plant should be of a design and such construction as to prohibit the possibility of the operator being able to touch any part of the pulverising mechanism or motor, whilst it is in motion. It is possible, in many instances, to provide the hopper or shoot feeding the equipment with metal or wood slats, and to extend the shoot or feed and reduce the size of the opening to make the insertion of the hand or forearm impossible.

Accidents occurring in connection with the operation of mixing rolls or, as some prefer to call them, mixing mills, arise from unguarded gearing, feeding and removing stocks, starting up the machine, electric shock, defective safety devices, knives and cuts, hot surfaces, congestion in the vicinity of the machine, slippery floors, inadequate light and ventilation, and entanglement in the rolls (the most serious injury). Gears should be guarded most thoroughly if an employee is engaged in the vicinity. The outside perimeter or face gears should be enclosed with a sheet steel band to prevent oil and grease from dropping on to the floor and into the mill pit. Keys and other projecting revolving parts, such as the ends of mill rolls, as well as spokes, should be covered with removable wire mesh or a similar stout material to permit of visual inspection of the gearing, and at the same time designed to permit of quick removal when necessary to repair the mill. Rigid and neat guards demand respect. With regard to speeds opinions vary, but where cutting and rolling of material is necessary, authoritative opinion has been given that the speed should not exceed 25 revs. per min. Higher speeds make these operations difficult and dangerous.

From a safety standpoint, mills with large diameter rolls are given preference. The distance from the top of rolls to the level on which the operator stands should be such that the operator cannot easily reach into the back of the roll. It is also essential where mixing rolls are installed, that operators be informed of the intention to start machinery in ample time to stand clear. Starting switches and levers can be connected so that a starting bell or some form of noise producer will automatically ring before the starter is operated. The starter should be located so that the entire line of mills controlled may be under observation. Pits in which electric motors are accommodated alongside the mill should be carefully fenced off. Oilers and maintenance workers should be enabled to carry on their work without danger.

German Tartaric Acid Industry Declines

COMPARED with the previous year, German tartaric acid exports in 1932 declined in quantity by 20 per cent. and a similar state of affairs is indicated for the first half of the present year. Expressed in money values, the decline is even more striking, the total exports of tartaric acid in the first half of 1933 being given as 1,554,000 marks as compared with 7,461,000 marks in the whole of 1931 and 4,293,000 marks in 1932. The export trade in tartar products has been even more severely hit. Goods (mainly refined cream of tartar) in this class to the value of 85,000 marks were exported in the first half of 1933, thus comparing very badly with the total 1932 figure of 644,000 marks.

Chemical Notes from Overseas

Red Lead Production in Brazil

THE manufacture of red lead in Brazil has increased considerably within the last few years. The present producers are the Cia. Auto Asbestos and the Usinas Tintas Transatlanticas, owned by Carlos Kuenertz, both in Sao Uaulo, and Zarcon Brazil Limitada, owned by Mayrink Veiga and Cia, in Rio de Janeiro. These companies import lead ingots, and produce red lead and litharge at prices which enable them to undersell foreign suppliers. It is reported that additional plants will be erected in Rio de Janeiro and Sao Paulo.

Portuguese Demand for Nitrocellulose Lacquers

A FAIR demand exists in Portugal for lacquers and the chief outlet is for refinishing automobiles. No automobiles are manufactured in the country and there is probably a greater proportional amount of used cars refinished than in automobile producing countries. Although paint products are manufactured, nitrocellulose lacquers are not produced. American brands of lacquers dominate the market and have succeeded in establishing excellent reputations. Some competition is afforded by British and German manufacturers, principally "Robbialac" and "Glasurit." Decided preference is shown for black lacquers, which account for about 60 per cent. of total sales.

Sicilian Lemon Oil

LEMON-OIL production in Sicily this year has been very meagre, owing to a reduction of citrate of lime production throughout Sicily. It is reported that less than 50 per cent. of the usual quantities of lemon oil has been available for sale. There have been little, if any, price benefits, by virtue of lack of demand in both Europe and the United States. An accurate production estimate is difficult, as the bulk of the oil is manufactured by thousands of small, widely scattered farmers. At least 75 per cent. of all the lemon oil produced during the season has been exported. It is understood that the present price for sponge essence is 1s. 1d. per Sicilian pound of 317 grams, whereas machine-pressed essence is 10.4d. per Sicilian pound. Statistics just published by the Bank of Sicily indicate that shipments of Sicilian lemon oil to all parts of the world during the calendar year 1932 totalled 3,548 quintals of 220 lb. each, valued at £117,524. Great Britain was the destination of 42 per cent. of the total amount exported, the United States, France, and Germany were the three next best customers, taking 17, 14 and 11 per cent. of the total exports. The remaining 16 per cent. was shipped to Australia, Spain, the Netherlands, Japan, Canada, and various other countries.

German Cyanamide Industry

BAYRISCHE Stickstoffwerke A. G., which furnishes over 80 per cent. of the total German cyanamide output showed net profits for 1932 of only 53,079 marks (compared with 16,908 marks in 1931) on a capitalisation of 12,000,000 marks. It controls the two principal cyanamide plants in Germany, namely, Trostberg and Piesteritz, with annual capacity of 55,000 and 35,000 tons respectively. It has always owned outright the Trostberg plant but operated the Piesteritz plant under lease from the Mitteldeutsche Stickstoffwerke A. G. (Central German Nitrogen Works Co.) until this year, when it acquired by purchase 18,000,000 marks of the latter concern's total capital stock of 20,000,000 marks, the remaing 2,000,000 marks being bought by the I. G. Farbenindustrie. The Mitteldeutsche Company had been controlled by the Reich Government through the Vereinigte Industrie Unternehmungen A. G. (United Industries Enterprises Co.), so that its sale to the Bayrische and I. G. Farbenindustrie marked a notable development and the definite withdrawal of the Reich from the cyanamide industry and its passing to exclusively private control under the dominance of the Bayrische Stickstoffwerke. The I. G. has been interested in the Piesteritz plant owing to contracts, whereby the plant manufactured, on a custom basis, nitrophoska, and ammonium phosphate. The improved type of cyanamide fertiliser in grain form, known as "Pearl Cyanamide," which was developed with a view to overcoming farmers' objections to the old type because of dust, met with a favourable reception on the part of consumers.

Match Imports in Siam

ACCORDING to a report from Bangkok, present indications point to a drop in match imports into Siam in the fiscal year ended March 31, 1933, compared with previous years. Data are not yet available for the 1933 fiscal year. During the Siamese fiscal year ended March 31, 1931, matches were imported into Siam to the value of £117,734. In the 1932 fiscal year this figure decreased to £44,234.

Chemicals at Malayan Exhibition

COMMERCIAL fertilisers were prominently displayed at the Tenth Malayan Agri-Horticultural Exhibition, held at Kuala Lumpur, Federated Malay States. Malayan Fertilisers, Ltd., of Kuala Lumpur, showed numerous examples of the effects of fertilising rubber, oil palms, pineapples, tea, coffee and vegetables. Crops exhibited for the first time on this stand included pepper, derris root, and a number of legumes. This firm has also paid much attention to gardening problems in Malaya and showed a full range of special fertilisers. Another attractive stand dealing with fertilisers and allied articles was that of the Singapore branch of Imperial Chemical Industries, which showed an impressive array of British-made chemicals for every Malayan requirement. Ammonia for preserving estate latex, sulphur for treating oidium disease, and various insecticides were among the features of interest to planters.

Chemistry of Building Materials

The Scientific Aspects of Plastering

THE bearing of chemical research on the building industry was discussed by Dr. F. P. Stowell, chief chemist to the Imperial Chemical Industries (Lime), Ltd., in a lecture on "The Scientific Aspects of Plastering," delivered at the Manchester School of Art, on October 18.

Dr. Stowell laid great stress on the progress that is being made by chemical research in the production of lime for plasters and on the efforts of the chemical industries to perfect their products and to meet the needs of the builders in every way possible. It was important, he said, that there should be co-operation between the producers of lime and the users of it, so that the producer should be fully acquainted with his customers' needs and difficulties and with the effectiveness of his products in use, and so that the user should be able, by the proper treatment, to get the best results from the materials he bought. Dr. Stowell gave an account of the processes in the manufacture of lime and of the various tests by which the chemical industry is trying to find the best limes for absorption, plasticity, quickness, and durability.

Further lectures are to be given by Mr. J. G. Wilson, on "Cement and how to use it," and by Mr. G. F. E. Doran, on "Concrete aggregates and their uses."

Absolute Zero

New Low Level of Temperature Reached

THE nadir of absolute temperature has been brought several steps nearer attainment. "Science Service" describes how eighty-five thousandths of a degree on the absolute scale has been achieved in the Kammerlingh-Onnes laboratory at the University of Leyden. Professor W. J. de Haas, of Leyden, and Professor H. A. Kramers, of Utrecht, used the method that is known as the "adiabatic demagnetization of paramagnetic salts." This takes advantage of the fact that when a substance is magnetized, it heats up. The substance is cooled as low as possible by means of liquid helium, then it is magnetized and the temperature rises. The heat is removed through evaporation of the liquid helium. Keeping the substance well insulated, it is now demagnetized and becomes colder as a result. Thus, a lower temperature than ever before attained has been reached.

Vital Municipal Elections

The Responsibilities of Citizenship

THE issues involved in the municipal elections, which will take place throughout the country next Wednesday, are, so far as they are financial, many times more important than the issues at stake in a pre-war general election. "These elections," said "The Independent" last week, "have an added importance because of the pressure now exerted from various quarters to extend the borrowing operations of these local bodies. Loans are all the fashion, and it is far too easy at the moment for any city or county to plant another few tens of thousands upon the unfortunate shoulders of the generations yet to come. It is not too much to say that in local government to-day the paramount consideration is sound finance, and thus it is the duty of electors to choose representatives, quite apart from their political affiliations, who can claim some qualifications for dealing with money matters.

"The case is common of some quite respectable person with an income of £500 a year, a social asset in his neighbourhood, who finds an unexpected interest and delight in presiding over a committee and signing cheques for £100,000 for some improvement scheme which in the end will prove to be no improvement at all. With an apathetic electorate and an easy money market, small blame can attach to the councillor who, having perhaps retired on a modest pittance from some small business, makes a pleasant recreation of managing affairs and spending sums quite outside his experience and altogether beyond his competence. In this country we run less risk of graft and corruption than any other, but a continuance for long of the unsound practices of the last few years must inevitably involve us in some degree of these evils.

"These and other circumstances give an importance to November 1 which is far too little recognised. They put upon each and every one of us the responsibility of taking the most active interest in our local elections and of striving to secure the services of representatives who give at least some indication that they recognise the seriousness and weight of the responsibilities which they propose to shoulder. If on this occasion, as in previous experience, when the results are announced we have the degradation of noticing 20 per cent., 30 per cent. and 40 per cent. polls, all our protestations about citizenship and interest in public affairs will receive a flat denial."

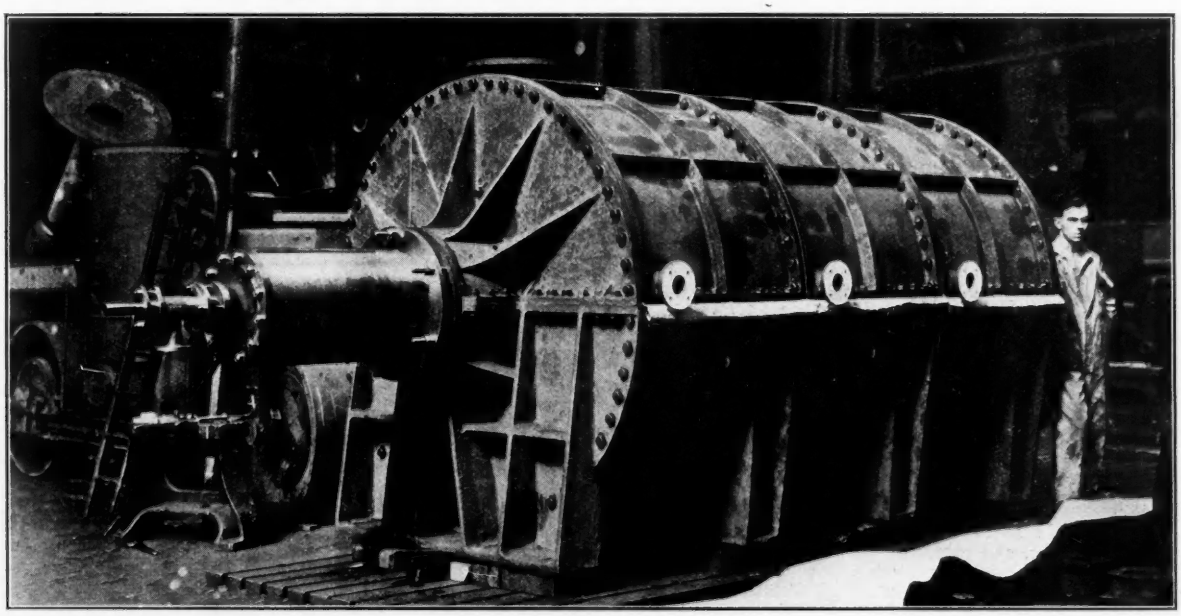
Society of Chemical Industry

Bristol Section

THE opening meeting of the Bristol section of the Society of Chemical Industry was held in the Chemical Department of Bristol University on October 19. The speaker was the president of the Society (Dr. J. T. Dunn), and his subject "Some Random Thoughts on our Society." Dr. Dunn pointed out the advantage of the existence of local sections in the chief centres of industry, and the formation of "subject groups," such as the chemical engineering, the food, and the plastics groups, which were now functioning successfully. He urged the members to do their duty by attending annual and sectional meetings, taking an interest in the government of the society, and endeavouring to increase the membership.

THE recently formed Compañia Electro Chimica Fluminense, Rio de Janeiro, has purchased German equipment for the production of caustic soda and chlorine derivatives. Experts have arrive to supervise installation. Neither the amount expended for plant and equipment nor capacity figures have been made public. Brazil imported 18,000 metric tons of caustic soda during 1932, whereof the United States furnished 25 per cent. Chief Brazilian processing industries utilising caustic soda are textile, soap, tanning paper, and glassware.

The "Waring" Patent Multiple-Effect Vacuum Filter



Although of quite recent introduction, the "Waring" patent vacuum filter has already proved to be a highly satisfactory unit. In the course of exhaustive tests Samuel Hodge & Sons, Ltd., the sole manufacturers and licencees in Great Britain, have found that the design of the machine can always be modified so that its applicability to processes involving the handling of material of an extremely wide range is definitely assured. The basic principle of the system is a combination of vacuum filtration, filter pressing and steam drying, when the latter effect is necessary or advisable. An alternative method of supporting the filtration surface does on certain grades of material greatly assist in the removal of filtrate with corresponding increase of cake delivery. A 24 inch machine in actual service was illustrated in THE CHEMICAL AGE, August 19, 1933, page 172. The above illustration shows another machine, 60 in. diameter × 10 ft. long, in course of erection ready for delivery to works in the South of England; similar machines of 36 in. and 16 in. diameter are in operation in other parts of the country.

News from the Allied Industries

Mineral Oil

NEGOTIATIONS FOR A MERGER between the Standard Oil Co., of California, and the Standard Oil Co., of New Jersey, have been definitely abandoned. No reasons have been disclosed so far for this step.

Rubber

THE PROBLEM OF RUBBER RESTRICTION will be discussed at a meeting at Batavia on November 22 between the Government Administration officials of Sumatra and Borneo. On October 13, the native rubber growers of Deli and Serdang declared in favour of restriction, but asked for equal rights with European growers.

China Clay

THE Dartmoor China Clay Co., Ltd., which exhibited at the recent Shoe and Leather Fair, claims to the pioneer in some of the methods which are now being used for the production of both normal grades of china clay and colloidal clays. This company was one of the first to take up the investigation of the production of colloidal clay, and has many years' experience in the production of both types. The phenomenal increase in the use of colloidal clays during the past decade is in itself a striking demonstration that this material has met an important need. This is particularly so in regard to the tanning industry, where it is being used in considerable quantities with great success.

Fertilisers

THE FRENCH STATE NITROGEN WORKS at Toulouse (Office National Industriel de l'Azote), have directed their main efforts during 1932-33 to the production of nitrogenous fertiliser. In consequence of the over-production of ammonium sulphate, the production of this fertiliser had to be restricted to 80,000 tons. The ammonium sulphate department of the Toulouse works is only employed up to 50 per cent. of capacity, while the capacity of the whole works, namely, a production of 240,000 tons of artificial fertiliser, is employed only to 38 per cent. Plant for the production of synthetic nitric acid was only installed in 1931 and even in 1932-33 supplied up to 250 tons daily. In December, 1931, the production of ammonium nitrate ("ammonitre granulé") was started and already covers 80 per cent. of the entire French consumption. The production of nitrogenous fertilisers will be further developed in order to free France from the need to import these products from Chile, Germany, Norway and the United States.

Iron and Steel

AN AGREEMENT HAS BEEN CONCLUDED between Stewarts and Lloyds, Ltd., and Colvilles, Ltd., whereby the latter will take over the steel plate business of Stewarts and Lloyds in Scotland and in the export markets of the world.

PLANS TO RECONDITION the Cardiff steelworks of the British (Guest, Keen Baldwins) Iron and Steel Co., Ltd., which will mean employment for 1,500 men, are disclosed in a letter which the Lord Mayor, Alderman C. F. Sanders, has received from the chairman of the company, Sir John Field Beale. It is stated that £2,000,000 is to be spent on the scheme, which provides for an annual output of 300,000 tons of billets and sheet bars. In his letter Sir John states that it has proved possible to make quicker progress with the proposal to reopen the Cardiff works of this company than seemed probable earlier in the year, and complete plans are now in existence. Previously, Free Trade had made it impossible to contemplate capital expenditure for the manufacture of billets and sheet bars in South Wales, though these commodities were formerly an important part of the output of the works at Ebbw Vale and Dowlais, and the importation of billets and bars into the ports of Cardiff and Newport totalled 207,000 tons in the year 1929, and 302,000 in the year 1932, in spite of the extraordinarily bad condition of the general trade of the country in the later years. The plans for the new works at Cardiff are therefore designed to remedy this dangerous position.

Artificial Silk

ANOTHER EXAMPLE of Japan's advance in the rayon and artificial silk trade is reported from Tokyo where the Fuji Spinning Co. has established a new subsidiary company for the production of artificial silk. This company, with a share capital of Yen 10,000,000, is to start with a daily production of 3.5 tons artificial silk and 1.5 tons pile fibre.

Insecticides

COOPER, MCDOUGALL AND ROBERTSON, LTD., manufacturers of sheep and cattle dip, insecticides, etc., announce that the statements which have appeared recently in certain sections of the Press regarding the company's trade and prospects of dividend are unauthorised and misleading. Until the accounts for the year, which has just closed, are received from overseas, the financial results of the year's trading cannot be ascertained.

Non-Ferrous Metals

THE COPPER DEVELOPMENT ASSOCIATION has secured the services of Mr. Basil Marriott as architectural adviser. Mr. Marriott has just concluded his work with the Empire Marketing Board.

EYSTEN BERG, representing the I. G. Farbenindustrie, has arrived at Ottawa, en route for Sudbury, Ontario, to negotiate for the purchase of a large stock of surplus nickel. His company recently sponsored the invention of a new process of refining nickel, through which it is expected many new uses will be found.

PRODUCTION IS BEING SPEEDED UP in the Northern Rhodesian copper areas, where expansion was for a long time hindered by the restrictive regulations of the Copper Exporters' Trust. Since the spring the output of the leading groups has been considerably increased and the development of new mining fields is being pushed forward.

SIGNIFICANT FIGURES showing the comparative amounts of tin consumed by the principal tin-consuming industries of the United States during the first seven months of 1933 are given in the latest bulletin of the International Tin Research and Development Council, issued from The Hague. Tin-consuming industries used a total of 32,649 tons of tin, compared with 21,236 tons in the corresponding seven months of 1932, an increase of 54 per cent.

Beet Sugar

THE GOVERNMENT'S PROMISE to continue the beet sugar subsidy until October 1, 1935, is to be embodied in a Bill, which will be one of the first measures to be submitted to Parliament in the new session. The Act which guaranteed a subsidy in respect of beet sugar manufacture for a period of ten years will expire in September, 1934. It has been decided to continue the sugar subsidy at the existing rate of 6s. 6d. per cwt. for twelve months beyond that date to give the industry more time in which to work out its reorganisation scheme. Differences between the sugar refiners and the beet sugar manufacturers were reconciled a few months ago, and the two branches of the industry are now co-operating in working out a long-term scheme for the home sugar industry. When agreement is reached it will, no doubt, be embodied in a marketing scheme under the Agricultural Marketing Act.

A REPRESENTATIVE BODY OF GROWERS paid a visit to the Kidderminster beet sugar factory, at the invitation of the West Midland Sugar Co., Ltd., on October 24, when a tour of inspection was made. They were about 500 in number, drawn from various parts of Warwickshire, Worcestershire, Staffordshire, Shropshire, Herefordshire and other counties, and an optimistic note was sounded as to the general health and future of the industry. During the season, which opened in September and ends in January, this factory will deal with 120,000 tons of sugar beet, and from it probably 1,300 tons or more of sugar will be obtained. The factory is receiving from 1,600 to 1,800 tons of beet daily.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

ALKALI CYANATES, manufacture.—Naamlooze Vennootschap Stikstofbindingsindustrie Nederland. Feb. 9, 1931. 399,820.

HIGHER ALCOHOLS, manufacture from fats or fatty oils.—E. I. Du Pont de Nemours and Co. Mar. 5, 1931. 399,848.

ACYLAMINO COMPOUNDS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Mar. 9, 1932. 399,790.

ARTIFICIAL FILAMENTS and like materials, processes and apparatus for manufacture.—British Celanese, Ltd., and W. I. Taylor. Mar. 12, 1932. 399,822.

ALIPHATIC ANHYDRIDES, manufacture.—H. Dreyfus. Apr. 1, 1932. 399,792.

ALIPHATIC ANHYDRIDES, manufacture or treatment.—British Celanese, Ltd., H. F. Oxley, L. Fallows and H. Dreyfus. Apr. 1, 1932. 399,793.

ARTIFICIAL SILK and the like products, production.—British Celanese, Ltd., R. P. Roberts and E. B. Johnson. Apr. 4, 1932. 399,795.

PURIFYING LIQUIDS which have been used for washing textile materials, process and apparatus.—E. C. Duhamel and Compagnie Generale des Industries Textiles. Apr. 7, 1931. 399,826.

PLASTIC MATERIALS, manufacture.—Kodak, Ltd. Apr. 9, 1931. 399,814.

AQUEOUS FINISHINGS and body colours, manufacture.—I. G. Farbenindustrie. Apr. 10, 1931. 399,816.

SOFTENING AGENTS, process for manufacture.—I. G. Farbenindustrie. Apr. 10, 1931. 399,817.

QUINOLINE-8-AZO COMPOUNDS of the quinine series, process for manufacture.—I. G. Farbenindustrie. Aug. 8, 1931. 399,818.

PLASTIC MASSES for dental impressions.—I. G. Farbenindustrie. Apr. 13, 1931. 399,842.

PLASTIC MATERIALS for the production of insulated conductors and of products therefrom, manufacture.—D. Traill and Imperial Chemical Industries, Ltd. Apr. 14, 1932. 399,868.

SIZING TEXTILE fibres.—I. G. Farbenindustrie. May 16, 1931. 399,905.

AZO DYESTUFFS, manufacture.—W. W. Groves (I. G. Farbenindustrie). May 17, 1932. 399,916.

CHLORINATION of paraffin and/or aromatic hydrocarbons.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Nov. 11, 1931. 399,991.

PREPARATIONS of starch-degrading enzymes, manufacture.—Kalle and Co. Akt.-Ges. Nov. 14, 1931. 399,998.

SOLID carbonaceous fuels.—Standard Oil Development Co. Dec. 12, 1931. 400,009.

DISAZO DYESTUFFS insoluble in water, manufacture.—I. G. Farbenindustrie. Dec. 24, 1931. 400,024.

DYEING and other treatment baths for textile materials made of or containing animal fibres.—Soc. of Chemical Industry in Basle. Jan. 16, 1932. 400,031.

PROCESS for treating artificial materials obtained from viscose.—Soie Artificielle de Gand, Soc. Anon. Sarga and Dr. M. G. Luft. Jan. 18, 1932. 400,035.

REMOVAL of acetylene from gases.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Feb. 23, 1932. 400,054.

DYESTUFFS and intermediate products therefor, manufacture.—Soc. of Chemical Industry in Basle.—Feb. 18, 1932. 400,059.

NUCLEAR SUBSTITUTION products of acenaphthalic acid and 1 :4 :5 :8-naphthalenetetra-carboxylic acid, manufacture.—I. G. Farbenindustrie. Mar. 2, 1932. 400,069.

SULPHURIC ACID, manufacture by the contact process.—Metallges Akt.-Ges. Aug. 4, 1932. 400,143.

Complete Specifications Open to Public Inspection

LACTONES, process for preparation.—Röhm and Hass Co. Apr. 13, 1932. 9574/33.

THIOCYAMATES of aromatic quarternary ammonium bases, process for production.—Kali-Chemie Akt.-Ges. Apr. 12, 1932. 9752/33.

3-METHYLAL-PENTANE and 3-methylol-pentane, manufacture.—Dr. A. Wacker Ges. für Elektrochemische Industrie Ges. Apr. 12, 1932. 10466-7/33.

PROCESS for separation of carbonic acid from gases containing the same.—I. G. Farbenindustrie. Apr. 12, 1932. 10717/33.

AZO DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. Apr. 11, 1932. 10804/33.

PROCESS of improving cellulose derivatives.—I. G. Farbenindustrie. Apr. 11, 1932. 10805/33.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Apr. 12, 1932. 10937/33.

CARBAZOLE COMPOUNDS, process for manufacture.—I. G. Farbenindustrie. Apr. 13, 1932. 10959-61/33.

DYESTUFFS of the gallocyanine series, manufacture.—I. G. Farbenindustrie. Apr. 14, 1932. 11103/33.

ALKYL-MERCURY-MERCAPTO COMPOUNDS, manufacture.—I. G. Farbenindustrie. Apr. 16, 1932. 11109/33.

MODIFIED POLYHYDRIC alcohol-polybasic acid resins and coating and moulding compositions manufactured therefrom, manufacture.—E. I. Du Pont de Nemours and Co. Apr. 16, 1932. 11169/33.

PLASTIC MATERIALS, production.—British Celanese, Ltd. Apr. 13, 1932. 11201/33.

PRODUCTION of vinyl compounds and compositions containing them.—British Celanese, Ltd. Apr. 16, 1932. 11299/33.

RUBBER DERIVATIVES, manufacture.—I. G. Farbenindustrie. Apr. 15, 1932. 11360-2/33.

Applications for Patents

ELECTRODEPOSITION of cadmium.—American Smelting and Refining Co., and E. S. Andrews. Oct. 18. 28885.

NON-FERROUS METALS.—H. C. Anstey and T. Bolton and Sons, Ltd. Oct. 21, 29160.

OLEFINE ALCOHOLS, etc., production.—H. T. Böhme Akt.-Ges. Oct. 17. 28710, 28745.

CONDENSATION PRODUCTS from alcohols, etc., manufacture.—British Industrial Solvents, Ltd., E. E. Connolly and H. Langwell. Oct. 17, 28712.

DISTILLATION of materials containing hydrocarbons.—E. W. Brocklebank and W. B. Mitford. Oct. 19. 29016.

EXPLOSIVE, production.—L. E. d'A. Callery. Oct. 16, 28616.

EXPLOSIVES.—L. E. d'A. Callery. Oct. 17. 28748.

FILTERS for liquids, air, and gases.—E. Carter and F. Carter. Oct. 20. 29037.

SALTS of polyhydroxycarboxylic acids derived from polyaldoses. Chemical Works, formerly Sandoz. Oct. 18. (Switzerland, Oct. 22, '32.) 28857.

OXYGEN-CONTAINING organic compounds, manufacture.—H. Dreyfus. Oct. 21. 29226.

VAT DYES, etc., manufacture.—E. I. Du Pont de Nemours and Co. Oct. 16. (United States, Oct. 15, '32.) 28646, 28647, 28648.

PROPELLED EXPLOSIVES, production.—E. I. Du Pont de Nemours and Co. Oct. 20. (United States, Oct. 27, '32.) 29071.

RECOVERY of sulphur from hydrogen sulphide.—Girdler Corporation. Oct. 16. (United States, Oct. 15, '32.) 28595.

TREATING HYDROCARBONS.—Gutehoffnungshütte Oberhausen Akt.-Ges. Oct. 20. (Germany, Oct. 20, '32.) 29109.

ORGANIC ACIDS, manufacture from aldehydes and primary alcohols. W. J. Hale. Oct. 18. 28811.

SULPHURIC ACID derivatives of organic sulphur compounds, manufacture.—Henkel et Cie, Ges. Oct. 17. (Germany, Nov. 18, '32.) 28737 and 28738.

ARTIFICIAL RESINS, manufacture.—R. Hessen and A. Nowack, Akt.-Ges. Oct. 19. 29011.

COLOURED COMPOSITIONS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Oct. 16. 28584.

VINYL ETHERS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Oct. 16. 28585.

VAT DYESTUFFS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Oct. 18, 28825.

NITROGENOUS condensation products, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Oct. 19. 28966.

METHYL CHLORIDE, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Oct. 21, 29204.

COLOUR COMPOSITIONS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Oct. 21. 29205.

ANTHRAQUINONE-2' :1' :1 :2-ANTHRAQUINONES, manufacture.—I. G. Farbenindustrie. Oct. 19. (Germany, Oct. 20, '32.) 28958.

ANTHRAQUINONE DYESTUFFS, manufacture.—I. G. Farbenindustrie. Oct. 20. (Germany, Oct. 21, '32.) 29125.

COLOURING LEATHER, etc., process.—Imperial Chemical Industries, Ltd. Oct. 17. 28702.

TREATMENT of motor fuels, etc.—International Hydrogenation Patents Co., Ltd., and H. E. Potts. Oct. 19. 28911.

DEPHENOLISING ammonia liquor.—Koppers Co. of Delaware. Oct. 20. (United States, Oct. 20, '32.) 29148.

APPARATUS FOR SUPPLYING CHLORINE, ETC., FOR THE TREATMENT OF LIQUIDS.—Bell Bros. (Manchester, 1927), Ltd., and C. G. Benson. Oct. 10. 27847.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THE following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

INDUSTRIAL chemicals have been in satisfactory demand during the week, the most active items being acetone, anhydrous ammonia, formaldehyde, and formic acid. Potassium chlorate and sodium sulphide have shown some improvement, while business in arsenic, caustic potash and barium chloride has been on a poor scale. There has been little change in the wood distillation market, with sales of charcoal showing an upward tendency. There has been an increased call for coal tar products and the price of xylol has again been increased. The position of pitch is still unsatisfactory. Sales of solvent naphthas, toluol and anthracene oil have been on a good scale and there has been an active interest in creosote oil for fuel purposes. Business in pharmaceutical chemicals has been steady with prices generally unchanged. There has been a good demand for aspirin and phenacetin, and hexamine, sodium benzoate and bromides have been fairly active. The phenolphthalein market shows some improvement. Essential oil business has been limited during the week but quotations are unchanged.

LONDON.—Prices generally continue very firm with a good steady demand. The demand for coal tar products remains good and prices are unchanged from last week.

MANCHESTER.—If progress in the movement of chemicals on the Manchester market is a slow process, the tendency is in the right direction. During the past week some seasonal expansion of interest in forward commitments has been experienced, though up to the present inquiry has been largely in the nature of price feelers and additions to contract commitments have not been extensive. There has, however, been a fair volume of buying for prompt and near deliverey positions, and consumers in the industries allied to textiles manufacture and in several other directions have been taking steady deliveries of materials already on order. The alkali products have been in fair request, and there has been a quietly steady movement of certain of the acids and of the potash and ammonia compounds. In the tar products section, there has been little improvement in the position of pitch, either from the point of view of new business or of prices, but sales of creosote oil for fuel purposes, and also of solvent naphtha and toluol, and other of the lighter products, have been reasonably satisfactory and values have maintained their firm tendency.

SCOTLAND.—There is no change of any importance to note other than that such chemicals as can only be obtained from Germany are subject to the fluctuation of the rate of exchange. Generally, business in Scotland is improving steadily.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9½d.

ACID, CRESYLIC.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%. 1s. 5d. to 2s.

ACID, FORMIC.—LONDON: £47 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £49 to £54 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 11d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON, £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £32 per ton; powdered, £34, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £17 c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £22 10s. at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—2s. 8d. to 3s.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3¾d. to 5d. per lb.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10½d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £3 19s. per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34 to £36; brown, £31.

LEAD NITRATE.—£28 per ton.

LEAD, RED.—SCOTLAND: £25 10s. to £28 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. per gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—9d. to 10d. per lb. nominal.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38.
POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.
POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.
POTASSIUM PERMANGANATE.—LONDON: 8¾d. to 9d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¼d. B.P., 9d.
POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8¾d. per lb. SCOTLAND: Yellow spot material, 8¼d. ex store. MANCHESTER: Yellow, 8¾d.
SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.
SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.
SODA, CAUSTIC.—Solid 76/77° spot, £14 5s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£22 per ton. LONDON: £23.
SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.
SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.
SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.
SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.
SODIUM CHLORATE.—£32 per ton.
SODIUM CHROMATE.—3¾d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£12 10s. per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £16 per ton f.o.b.
SULPHUR.—£11 10s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 3d. to 4s. 5d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.
ZINC SULPHIDE.—11d. to 1s. per lb.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
DICHLORANILINE.—2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROTOLUENE.—48/50° C., 8¼d. per lb.; 66/68° C. 10d.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 15s. in casks, in 1-ton lots.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—4s. 6d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 10d. per lb.; crude, 60's, 2s. 5d. to 2s. 6d. per gal. MANCHESTER: Crystals, 9½d. per lb.; crude, 2s. 8d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.
ACID, CRESYLIC.—90/100%, 1s. 6d. to 1s. 9d. per gal.; pale, 98%, 1s. 4d. to 1s. 5d.; pale 95%, 11d. to 11½d.; dark, 10d., all according to specification; refined, 1s. 8d. to 1s. 9d. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark, 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4½d. per gal.
BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor 1s. 4d. to 1s. 4½d.; 90%, 1s. 5d. to 1s. 6d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.
NAPHTHA.—Solvent, 90/160%, 1s. 4d. to 1s. 5d. per gal.; 95/160%, 1s. 8d.; 99/190%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
CREOSOTE.—B.S.I. Specification standard, 3d. to 3½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3d. to 4½d. SCOTLAND: Specification oils, 3½d. to 4d.; washed oil, 3½d. to 4d.; light, 3½d.; heavy, 4½d. to 5d.
NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked £10 per ton. Purified crystals, £9 15s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.
PITCH.—Medium soft, £3 17s. 6d. to £4 per ton. SCOTLAND: £3 15s. to £4 f.o.b. Glasgow. MANCHESTER: £3 12s. 6d. to £3 17s. 6d. f.o.b. LONDON: £3 15s. f.o.b. East Coast port for next season's shipment.
PYRIDINE.—90/140, 4s. 3d. to 5s. 6d. per gal; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 1s. 9d. to 2s. naked.
REFINED COAL TAR.—SCOTLAND: 4d. per gal.
TOLUOL.—90%, 2s. 5d. to 2s. 6d. per gal.; pure, 2s. 10d.
XYLOL.—Commercial 2s. 5d. to 2s. 6d. per gal.; pure, 2s. 6d. to 2s. 7d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home, £6 15s. per ton; export, £6 8s. 9d. f.o.b. U.K. ports in single bags.
CYANAMIDE.—£7 per ton, carriage paid to railway station.
NITRATE OF SODA.—£7 8s. 6d. per ton nearest station.
NITRO-CHALK.—£7 5s. per ton nearest station.
CONCENTRATED COMPLETE FERTILISERS.—£10 15s. to £11 6s. per ton according to percentage of constituents.
NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton according to percentage of constituents.

Latest Oil Prices

LONDON, Oct. 25.—LINSEED OIL was firm. Spot, £19 10s. (small quantities, 30s. extra); Nov. £18; Nov.-Dec., £18 5s.; Jan.-April, £18 12s. 6d. May-Aug., £19 2s. 6d. RAPE OIL was quiet. Crude extracted, £27; technical refined, £28 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian, crude, £16, refined, common edible, £19; deodorised, £21, naked, ex mill; small lots, 20s. extra. TURPENTINE was easy. American, spot, 46s. per cwt.
HULL.—LINSEED OIL, spot, quoted £19 per ton; Oct., £18 10s.; Nov.-Dec., £18 15s.; Jan.-April, £18 17s. 6d.; May-Aug., £19 2s. 6d. COTTON OIL, Egyptian, crude, spot, £15 10s.; edible, refined, spot, £17 15s.; technical, spot, £17 15s.; deodorised, £19 15s., naked. PALM KERNEL OIL, crude, f.m.q., spot, £17 10s., naked. GROUNDNUT OIL, extracted, spot, £21 5s.; deodorised, £25 5s. RAPE OIL, extracted, spot, £26; dorised, £22 10s. per ton. COD OIL, 21s. per cwt., nominal. refined, £27 10s. SOYA OIL, extracted, spot, £19 10s.; deo- CASTOR OIL, pharmaceutical, 37s.; first, 32s.; second, 29s. per cwt. TURPENTINE, American, spot, 48s. 6d. per cwt.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Australia.—The British Trade Commissioner at Melbourne reports that the Victorian Railways Commissioners are calling for tenders to be presented in Melbourne by November 29, 1933, for the supply of 12 tons of sodium acetate. (Ref. F.Y. 1889.)

Canada.—A well-established firm of manufacturers' agents in Toronto is desirous of obtaining the representation of United Kingdom manufacturers of scientific and optical instruments, thermometers, etc. They are prepared to work on a commission basis and their organisation covers the whole of the Western Provinces of the Dominion. (Ref. No. 456.)

Company News

William Blythe & Co.—The directors announce an interim ordinary dividend of 3 per cent., less tax, on the ordinary shares.

Burmah Oil Co.—The directors have announced an interim dividend of 5 per cent., less tax, on the £6,868,256 of ordinary stock (1s. per £1 unit). In June last the ordinary shares were converted into £1 units of stock.

Bryant & May, Ltd.—The usual half-yearly payment has been declared on the preference shares and interims of 6 per cent. tax free, on the ordinary shares and 5 per cent., tax free, on the partnership shares.

Rio Tinto Co., Ltd.—It is announced that the half-year's dividend of 2s. 6d. per share will be paid as usual on the 5 per cent. preference shares, less tax, on November 1, but that no interim on the ordinary shares will be paid this year.

Cheshire United Salt Co.—The accounts for the year ended June 30, 1933, show a manufacturing profit of £5,890 and a net profit of £702. The annual meeting will be held on October 30, at Winchester House, London, at 12 noon.

Eastern Chemical Co.—After maintaining plant and writing off £4,015 for depreciation, etc., the report for the year ended March 31, 1933, states that there is a loss of £7,148. The trading loss amounted to £3,133. The depreciation fund now stands at £21,679.

Shawinigan Water and Power Co.—A dividend on the common shares of 12 cents. for the quarter ended September 30, 1933, is payable on November 15, to shareholders of record on October 25. The gross revenue for the year 1933 is $3,096,556 and the operating expenses $1,236,734. Fixed charges amount to $1,028,296 leaving a surplus (before depreciation and tax) of $831,526.

Electrolytic Zinc Co. of Australasia.—For the year to June 30, 1933, the net profits amounted to £223,093, after providing £145,000 for amortisation and depreciation and £49,706 for taxation, compared with £85,090 in the previous year, when a similar depreciation charge was made. Out of this profit there has been appropriated for the debenture sinking fund reserve £21,000 and for new plant and development £20,000.

Midland Tar Distillers.—The profit to June 30, 1933, including interest on investments, was £33,252, against £42,272 in the previous year. From £29,805 brought in, £10,000 has been transferred to contingency reserve, leaving £19,805 and making £53,058. The preference dividend requires £5,535; 2½ per cent. final on the ordinary shares, making 5 per cent. tax free, for the year, £19,084, and general reserve £9,835, leaving to be carried forwad £18,602.

Glenboig Union Fire Clay Co.—A trading loss for the year to August 31 last of £2,073, is reported, against a loss of £9,827 in the previous year. After bad debts and depreciation have been provided for, and including £412 brought forward and £4,000 transferred from reserve there remains a credit of £241 to be carried forward. The annual meeting will be held at 48 West Regent Street, Glasgow, on November 1, at 12 noon.

Sub Nigel, Ltd.—A working profit for the year ended June 30 last, of £1,348,728 is reported, compared with £827,892 in the previous period. The total profit is £1,362,665, against £831,964. The sum available is £1,405,184; dividends amounting to 105 per cent., against 75 per cent. for 1931-32, absorb £848,347, tax £225,016 and excess profits duty £143,078. After expenditure on equipment, etc., the balance forward is £74,457, compared with £42,519 brought in.

Broken Hill Proprietary Co.—The net profit for the year to May 31 last was £313,617, after allowing £300,483 for depreciation and £34,128 for debenture interest, which compares with £103,720 in 1931-32, when the two former charges were £252,590 and £47,419. Two dividends of 5 per cent. were paid. After provision for all outstanding liabilities there remain liquid assets of £410,432, inclusive of reserve and insurance funds. The half-yearly dividend of 5 per cent., Australian currency, has been declared payable on November 15.

Explosives and Chemical Products, Ltd.—The profit for the year to June 30 last, after depreciation and remuneration of directors is £11,916, against £11,443 in the previous year. To this is added the balance brought forward of £20,461, making a credit balance on profit and loss of £32,377. The directors again recommend a dividend on the ordinary shares at the rate of 16⅔ per cent., tax free, in proportion to amounts paid up at date of balance sheet, and a dividend on the deferred shares of 6.0717d. per share, tax free. The dividends will absorb £10,173, leaving to be carried forward £22,204.

Forthcoming Events

Oct. 28.—Institute of Chemistry (Bristol Section). Joint meeting with the College Chemical Society. "The Perishing of Paper in Indian Libraries." Professor J. J. Sudborough. 5.15 p.m. University College, Exeter.

Oct. 28, Nov. 4, 11, 18.—Royal Institution. "The Course and Causes of the World Depression." L. C. Robbins. 3 p.m. Albemarle Street, London.

Oct. 30.—Society of Chemical Industry (Yorkshire Section) and Institute of Chemistry (Leeds Section). "Corrosion." Dr. U. R. Evans. 7.15 p.m. New Chemistry Building, University, Leeds.

Oct. 30.—National Institute of Industrial Psychology. "Experiences of a Vocational Adviser Concerning Occupational Guidance." Dr. A. Macrae. 6 p.m. London School of Economics, Aldwych, London.

Oct. 31.—Hull Chemical and Engineering Society. "Recent Developments in Piled Foundations." R. G. Tarran. 7.45 p.m. Hull Photographic Society's Room, Grey Street, Park Street, Hull.

Nov. 1.—British Association of Chemists (Liverpool Section). "Synthesis of Sugars from Carbonic Acid by the Action of Light." Professor E. C. C. Baly. 7.30 p.m. University, Liverpool.

Nov. 1.—Society of Public Analysts. Discussion on "The Chemical (as distinct from physiological) Tests for Vitamins." Opened by A. L. Bacharach. 8 p.m. Burlington House, London.

Nov. 1.—Institute of Physics. "Physics in the Building Industry." Dr. R. E. Stradling. 5.30 p.m. 21 Albemarle Street, London.

Nov. 1.—Institution of the Rubber Industry (West of England Section). "Laboratory Control as applied to Manufacturing Conditions." M. M. Heywood. Town Hall, Trowbridge.

Nov. 2.—The Chemical Society. Papers by A. W. Chapman, C. C. Howis, R. G. W. Norrish, H. G. Crone, Miss O. Saltmarsh, L. P. Walls, G. T. Morgan and A. E. J. Pettet.

Nov. 2.—Society of Chemical Industry (Bristol Section). "Colour Measurement." G. S. Fawcett. 7.30 p.m. University Chemical Department, Woodland Road, Bristol.

Nov. 3.—The Chemical Society. Bedson Lecture. "Vitamin B." Professor R. A. Peters. 6.30 p.m. Chemistry Lecture Theatre, Armstrong College, Newcastle-on-Tyne.

Nov. 3.—Society of Chemical Industry and the Institute of Chemistry (Glasgow Sections). A discussion on Commercial Affairs. 7.30 p.m. Royal Technical College, Glasgow.

Nov. 3.—Society of Dyers and Colourists (London Section). Debate on "Non-Inflammable versus Inflammable Solvents in Dry Cleaning." W. Brown and C. L. Bird. London.

Nov. 3.—Society of Chemical Industry (Manchester Section). Joint meeting with Society of Dyers and Colourists and Institute of Chemistry. "Research in the Infra Red." Sir Robert Robertson. Room C2, College of Technology, Manchester.

Books Received

An Introduction to Thermodynamics for Chemists. By D. Johnston Martin. London: Edward Arnold & Co. Pp. 343. 16s.

Mass-Spectra and Isotopes. By F. W. Aston. London: Edward Arnold & Co. Pp. 248. 15s.

Qualitative Chemical Analysis. By Roy K. McAlpine and Byron A. Soule. London: Chapman & Hall, Ltd. Pp. 696. 21s.

Allen's Commercial Organic Analysis. Vol. X. Proteins of Blood, etc. Vitamins, Hormones, Woods and Charcoals, Pectic Substances. General Index. Pp. 817. 32s.

The Laboratory Workshop. By E. H. Duckworth and R. Harries. London: G. Bell & Sons, Ltd. Pp. 246. 10s.

Introduction to Physical Chemistry. By Alexander Findlay. London: Longmans, Green & Co. Pp. 492. 7s. 6d.

Fluorescence Analysis in Ultra-Violet Light. By J. A. Radley and Julius Grant. London: Chapman & Hall, Ltd. Pp. 220. 15s.

Official Publications

Conditions and Prospects of United Kingdom Trade in India, 1932-33. Report by Sir Thomas M. Ainscough. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 240. 3s. 6d.

From Week to Week

AT THE INAUGURATION on Friday of the new session of the West of Scotland Iron and Steel Institute Dr. Andrew M'Cance was installed as President.

SATISFACTION IN FULL, on September 8, 1933, of a charge constituted by an issue of 8 per cent. secured notes for £100,000, authorised September 14, 1932, and registered September 28, 1932, has been notified by the Chemical and Metallurgical Corporation, Ltd.

PRELIMINARY NOTICE has been given of the annual meeting of the refractory materials section of the Ceramic Society, to be held in London on November 22 and 23. The programme will include a visit to the Royal Doulton potteries, the reading of papers and a dinner at Grosvenor House.

THE CHILEAN NITRATE BILL, embodying what is known as the "Ross Plan," for the reconstitution of the industry, is now being discussed at Santiago by a special session of Congress. The vital vote will probably be taken at the end of the month. The Government has dissipated rumours of a withdrawal by announcing that it will uphold the Bill to the end.

A REDUCTION OF THE CAPITAL of W. C. Holmes and Co., Ltd., from £120,000 to £85,000 was confirmed by Mr. Justice Maugham, in the Chancery Division on October 23. It was stated that the reduction was to be effected by returning 14s. per share on each of the 50,000 issued ordinary shares. The capital was in excess of the needs of the company.

IN GOVERNMENT CIRCLES in Dublin it is stated that the first distillery for the manufacture of industrial alcohol from potatoes in the Irish Free State will be established in County Louth, probably at Dundalk. This will be in the nature of a full-scale experiment, and if this distillery proves a success others will be established in different parts of the country.

DR. H. J. ROSE, a senior fellow of Mellon Institute of Industrial Research, Pittsburgh, has been elected chairman of the gas and fuel division of the American Chemical Society for the year 1933-34. Dr. Rose, who has been a member of the Mellon Institute research staff since 1918, has made many important contributions to the literature of by-product coke technology and coal classification. He now heads a multiple industrial fellowship that is engaged in research on anthracite.

A NEW DIPLOMA COURSE IN SUGAR TECHNOLOGY (engineering) has been instituted at the Royal Technical College, Glasgow, and the school is now the only one in the British Empire providing qualifying courses in both the chemical and engineering branches of sugar technology. The practical classes have been taxed to capacity and it has been found necessary to equip a new laboratory solely for sugar work.

REPRESENTATION HAS BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for the exemption of amino guanidine sulphate and butyl acetyl ricinoleate from Key Industry Duty under Section 1 of the Safeguarding of Industries Act, 1921, as amended by the 1926 Act. The ground of the misrepresentation is that the material is not made, and is not likely to be made, in any of the British Dominions in substantial quantities, having regard to the requirements of the United Kingdom. Communications on the subject should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than November 23.

THE FIFTH AUTUMN RESEARCH MEETING of the Institution of Gas Engineers will be held on November 7 and 8 at the Institution of Mechanical Engineers, when the reports of the general research committee, the joint research committee of the Institution and Leeds University (corrosion from products of combustion of gas), the liquor effluents and ammonia sub-committee, the refractory materials joint sub-committee, the gasholder sub-committee and the gas education committee will be presented and discussed. The agenda also includes a report on "The Behaviour of Cokes in the Open Grate," contributed by H. J. Hodsman, Dr. E. I. Lloyd and F. Pell, of Leeds University, and a report on "Leakage in Horizontal Gas Retorts," contributed by A. H. Clucas, of the Leeds Gas Department.

A DELEGATION REPRESENTING the United Kingdom coke producers and coke exporters has left for Sweden to study, in consultation with representatives of Swedish coke consumers and importers, the position of the United Kingdom coke export market in Sweden, and to consider what steps can be taken to bring about closer co-operation and a larger volume of trade. The delegation will afterwards visit Finland to discuss with importers of coke in that country the measures that are necessary to maintain and increase the United Kingdom share in the Finnish coke market, as provided in the protocol to the Anglo-Finnish Agreement recently concluded. Mr. W. Pollock is representing coke-oven coke producers; Mr. E. W. Barnett and Mr. Norman Bellerby are representing gas coke producers.

MR. ARTHUR HOLLINS, general secretary of the National Society of Pottery Workers, has been appointed to be a member of the Post Office Advisory Council, in place of the late Mr. C. T. Cramp. He is also a member of the Board of Trade Committees under the Safeguarding of Industries Act.

A NEW ANAESTHETIC, which by intravenous injection produces "short anaethesia," lasting from 15 to 20 minutes, has been exhibited at the London Medical Exhibition at the Royal Horticultural Hall, this week. So effective is the preparation that it is claimed that patients come to after an operation absolutely ignorant of the fact that they have been unconscious.

THE NORTHERN AREA COMMITTEE of the Coal Utilisation Council, which has been established to promote the sale of British coal, held its first meeting at Newcastle on October 24. Mr. Ridley Warham was elected chairman of the committee, with Mr. S. E. D. Wilson as vice-chairman, and Mr. J. T. Robson, Coal Trade Offices, Newcastle, as secretary.

MR. JUSTICE MAUGHAM, in the Companies Court on October 23, adjourned for a week a petition by Mr. Bernard Holland, an engineer, of Chelsea, for the compulsory winding-up of the Darlington Rustless Steel and Iron Company, Ltd. The petition was before the court a fortnight ago, and was adjourned to enable the company to bring forward a scheme of arrangement.

FIFTEEN OF THE FORTY-FOUR PAPERS read at the meetings of the glass section of the First International Congress of Glass and Ceramics, held in Milan and Venice, were contributed by British members, despite the fact that seven nations were represented. Professor W. E. S. Turner, of Sheffield University, was elected president of the International Commission, which was set up to stimulate scientific and technological progress.

THE POST OFFICE ENGINEERING RESEARCH STATION at Dollis Hill, London, was formally opened by the Prime Minister on October 23. Mr. Macdonald said he could remember the beginning of such experiments as were now being carried on. It was his good fortune, shortly after coming to London, to become acquainted with Sir William Preece, who was then engineer to the Post Office, and in the course of that friendship he came in contact with Signor Marconi, who was then beginning to make public the first results of his researches into wireless.

TO CELEBRATE THE OPENING of the one-thousandth branch of Boots Pure Drug Co., a luncheon was held at the Savoy Hotel, London, on October 19. Lord Trent, who presided, said that Boots had signalised their fiftieth anniversary in a number of ways. The ownership of the company had returned to this country, they had opened in Nottingham their new factory and were now inaugurating their one-thousandth branch. By pressing a button at the Savoy Hotel, Lady Trent released the door of the shop at Galashiels.

RECENT WILLS include:—Frederick William Fanshawe, of Yarwell, Northamptonshire, dyer and finisher, £76,882 (net personalty nil); Sir Kenyon Pascoe Vaughan-Morgan, M.P., of 1 Hans Place, Chelsea, S.W., vice-chairman of the Morgan Crucible Co., Ltd., Battersea, and a director of L. and N. Coal Distillation Ltd., who died on August 21, aged 60 years, son of the late Edward Vaughan-Morgan, one of the founders of the "Chemist and Druggist," £176,031 (net personalty £162,757); Mrs. Eliza Barbour Hill-Jones, of Invicta Works, Bow Common Lane, London, E., who died on September 2 last, widow of Thomas Hill-Jones, value of £15,791 (net personalty £15,736).

THE RAMSAY MEMORIAL FELLOWSHIP TRUSTEES have made the following awards of new Fellowships for the year 1933-34:—Dr. A. G. Winn, British Fellowship of £300, tenable for two years, at University College, London; Dr. N. W. H. Addink, Netherland Fellowship of £300, at Cambridge University; Dr. J. Smittenberg Netherland Fellowship of £300, at Bristol University. The trustees have renewed the following Fellowships for the same year: Dr. J. M. Albareda (Spanish Fellow), Rothamsted Experimental Station, Harpenden, Herts; Dr. Walter Cawood (British Fellow), Leeds University; Dr. C. Kawassiades (Greek Fellow), University College, London; Dr. Mario Liguori (Italian Fellow), Oxford University; Dr. John MacArthur (Glasgow Fellow), Royal Institution, London.

THREE MEN WERE INJURED, two being detained in hospital in a serious condition, as the result of an explosion followed by a fire in one of the six condensers at the by-product plant at the Shelton Iron and Steel, and Coal Co.'s works at Stoke-on-Trent on October 23. The men detained in hospital were Francis Wilshaw (24), a fitter's labourer, of Brookhouse Lane, Hanley, and Frederick Parkes (29), fitter's labourer, of Longton. Joseph Harrison, fitter's labourer, of Stoke, received severe burns to the hands and feet, but was able to go home after treatment. The men were repairing a condenser 40 ft. high and were on a staging 20 ft. from the ground when an explosion flung them off.

TWO IMPORTANT ADDITIONS to the technical laboratories in the service of the Dyestuffs group of Imperial Chemical Industries, Ltd., were inaugurated at Blackley, Manchester, on October 26. Equipped with the most modern apparatus capable of carrying out the most intricate tests, the laboratories will also carry out experiments upon rubber. A machine has been perfected for testing the fading of coloured rubber, used in bathing caps, and for "ageing" purposes.

NOTICE WAS GIVEN in the "London Gazette" of October 20 of the voluntary winding up of Allen Liversidge, Ltd., and of the Dissolved Acetylene Co., Ltd. In both cases Mr. N. M. Shaw, of Victoria Station House, Westminster, has been appointed liquidator. On October 24 notice was given of the voluntary winding up of the Millbank Engineers, Ltd. In this case Mr. H. Eaton-Williams, of 25 Victoria Street, London, has been appointed liquidator.

LOW TEMPERATURE CARBONISATION PLANT, working on the system invented by Mr. H. P. Hird, A.I.C., a director of British Carbonised Fuels, Ltd., Bradford, also well known in the chemical industry as the inventor of the Hird continuous tar distillation plant, is being installed at Nostell Collieries, near Wakefield. It is intended that the ultimate capacity of the plant will be 200 to 250 tons per day. The first unit of the plant will be in operation in January, 1934.

OCTOBER 21 WAS THE CENTENIAL ANNIVERSARY of the birth of Alfred Bernard Nobel, pioneer in the manufacture of high explosives. By the incorporation of "Nobel's oil" (nitroglycerine) with kieselguhr, the first dynamite was patented in 1862. By 1871 Nobel had constructed the first factory at Ardeer, the beginning of Nobel's Explosives, Ltd., now part of Imperial Chemical Industries. At the time of his death in 1896 he had accumulated a fortune of about £2,000,000.

SULPHURIC

ALL STRENGTHS

Hydrochloric, Nitric, Dipping, Hydrofluoric, Lactic, Perchloric

F. W. BERK & CO., LTD.

Acid and Chemical Manufacturers since 1870.

106 FENCHURCH ST., LONDON, E.C.3

Telephone: Monument 3874. Wires: Berk, Phone, London.

Works: Stratford, E., and Morriston, Glam.

TAS/Ch.145

THE SCIENTIFIC GLASS BLOWING CO.

(MANCHESTER)

EXPERTS FOR ALL KINDS OF SPECIAL DESIGN APPARATUS IN **SODA, PYREX, JENA** AND OTHER LEADING RESISTANCE GLASSES, **QUARTZ AND VITREOSIL.**

PYROMETER & COMBUSTION TUBES IN PYTHAGORAS COMPOUND; gas tight at 1,400°C. maximum heating temperature 1,750°C. List with full particulars on application

REPAIRS UNDERTAKEN AT OWNERS' RISK.

SOLE ADDRESS:

12-14 WRIGHT STREET, OXFORD ROAD, MANCHESTER.

'Grams: "Soxlet" M/C. 'Phone: Ardwick 1425.

CARBONATE of AMMONIA
PRECIPITATED CHALK
(extra light)

BROTHERS CHEMICAL CO. (1922) LTD.

TRAFFORD PARK, MANCHESTER.

DRYING APPARATUS AND DRYING PLANT

FOR ALL PURPOSES

Complete Chemical Plants

PROCESS — ERECTION — OPERATION

Works: CARLISLE

L. A. MITCHELL LTD. Phone: CHEMICAL ENGINEERS BLA. 7106-7

37 Peter Street, Manchester

OLEUM (all strengths)

Sulphuric, Battery, Dipping, Muriatic, Nitric, and Mixed Acids.

SPENCER CHAPMAN & MESSEL Ltd.

With which is amalgamated WILLIAM PEARCE & SONS, Ltd.

WALSINGHAM HOUSE, SEETHING LANE, E.C.3.

Telephone: Royal 1166. Works: SILVERTOWN, E.16.

Telegrams "Hydrochloric Fen, London."

GLYCERINE

We supply all grades for pharmaceutical and industrial purposes. May we have your inquiries?

GLYCERINE, LTD.

Unilever House, Blackfriars, London, E.C.4

Phone Central 7474. Telegrams: Glymol, Lud, London

GET-2-2 4

LACTIC ACID

SULPHONATED OILS

TANNERS' MATERIALS

• • •

BOWMANS (WARRINGTON), LTD.

CHEMICAL MANUFACTURERS

Moss Bank Works : : : Near WIDNES.

BRITISH ASSOCIATION OF CHEMISTS

Unemployment Insurance. Over £9,500 paid

Legal Aid. Income Tax Advice. Appointments Bureau

Write for particulars to :—

C. B. WOODLEY, C.R.A., F.I.S.A.
General Secretary, B.A.C.

"EMPIRE HOUSE," 175, PICCADILLY, LONDON, W.1

'Phone : Regent 6611